1980 C.B. ANNUAL REPORT

VOLUME 2A

VOLUME 2 SUPPORTING DATA

CATHEDRAL BLUFFS SHALE OIL COMPANY

TENNECO SHALE OIL COMPANY

OCCIDENTAL OIL SHALE INC., OPERATOR

751 HORIZON COURT

GRAND JUNCTION, COLORADO 81501

APRIL 30, 1981

1980 C.B. ANNUAL REPORT

APPENDIX 2A

VOLUME 2 SUPPORTING DATA

April 30, 1981

Submitted by:

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to:

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FOREWORD

The 1980 C.B. ANNUAL REPORT is submitted to fulfill the requirements of Oil Shale Lease Number C-20341 as stated in Section 16(b) of the Lease, Section 1.(C)(4) of the Lease Environmental Stipulations, and Condition of Approval (No. 3) of the Detailed Development Plan issued on August 30, 1977. This report consists of the following volumes:

Volume 1 - Summary of Development Activities, Costs and Environmental Monitoring

Volume 2 - Environmental Analysis

Appendix 2A - Volume 2 Supporting Data

USERS GUIDE TO APPENDIX 2A

Appendix 2A contains supporting data for the 1980 C.B. Annual Report, Volume 2, Environmental Analysis. These data appear in the form of supporting analyses, figures, and tables.

A table of Appendices, a list of tables, and a list of figures which are referenced in Volume 2 as belonging in Appendix 2A are provided for this appendix.

Numbers assigned to supporting appendices, tables and figures serve as a cross reference to section designations of Volume 2. The second- and third-level numbers correspond to the same second- and third-level section numbers in Volume 2 (e.g., Table A5.2.1-1 contains supporting data for Section 5.2.1 of Volume 2, while Appendix A5.3.2 contains supporting data for Section 5.3.2 of Volume 2). All supporting appendices, tables, and figures appear in alpha-numerical order by section number.

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CHAPTER 2.0

Tract Development Schedule and Maps

APPENDIX A2.2

COMPUTER STATION CODES

Four-digit computer codes have been designated for monitoring stations to be used with a computerized data base management system (RAMIS). A major portion of the raw data collected at the C-b Tract is retained in RAMIS. Once entered the data can be retrieved for reporting and/or statistical analysis. The codes reduce storage space and provide a systematic identification to access station data sets. The code consists of two letters followed by two numbers:

AB23

- 23 → Station number
- B → Study or category (Example: air quality trailer)
- A → Program area
  Examples:

  A = air
  N = noise
  W = water
  B = biology
  P = photography

The codes are presented in Table A2.2-1 for the environmental program along with the current station designations. An attempt has been made throughout this report to refer to all stations in terms of their four-digit codes.

TABLE A2.2-1

Computer Code and Station I.D. Cross-Reference

I Air Quality & Meteorology

	Sta. Designation		Computer Code
Met. Tower:	Sta	023	AA23
Trailers:	Sta	020	AB20
		021	AB21
		022	AB22
		023	AB23
		024	AB24
Acoustic Radar	Sta	020	AC20
		021	AC21
		023	AC23
MRI and Particulates	Sta	031	AD31
		032	AD32
		033	AD33
		041	AD41
		042	AD42
		043	AD43
		044	AD44
		056	AD56

II Biology

Program	General Location	Computer Code - *Analysis Code
Deer Days Use	Between Hunter Cr. & Jimmy Gulch	BA01 - PJ-CH-C
		BA02 - PJ-CH-C
		BA03 - PJ-CH-C
		BA04 - PJ-CH-C
		BA05 - PJ-CH-C
		BA06 - PJ-CH-C
		BA07 - PJ-CH-C
		BA08 - PJ-CH-C
		BA09 - PJ-CH-C
	North Side, Piceance Creek	BA10 - PJ -D
		BA11 - PJ -D
		BA12 - PJ -D
		BA13 - PJ -C
		BA14 - PJ -C
		BA15 - PJ -C
	South Side, Piceance Creek	BA16 - PJ -D
	On Tract bet. Cottonwood & Scandard	BA17 - PJ-CH-C
		BA18 - PJ-CH-C
		BA19 - PJ -C
	On Tract bet. Cottonwood & Sorghum	BA20 - PJ-CH-D
		BA21 - PJ-CH-D
		BA22 - PJ -D
	On Tract bet. Sorghum & W. Fork Stewart	BA23 - PJ-CH-D
		BA24 - PJ
		BA25 - PJ-CH-C
	On Tract bet. W. & M. Fork Stewart	BA26 - PJ -C
		BA27 - PJ -C
	On Tract bet. Willow & Scandard North End	BA28 - PJ-CH-C
	On Tract bet. Willow & Scandard S.E.	BA29 - PJ-CH-C
	On Tract bet. Cottonwood & Sorghum North	BA30 - PJ-CH-C
	On Tract bet. Cottonwood & Sorghum South	BA31 - PJ-CH-C

*ANALYSIS CODES:

PJ-CH-C - Pinon Juniper, Chained, Control Station (12)
PJ -C - Pinon Juniper, Control Station (6)
PJ-CH-D - Pinon Juniper, Chained, Development Station (3)
PJ -D - Pinon Juniper, Development Station (6)

TABLE A2.2-1 (CONTINUED)

Biology (Cont'd)

Programs: Deer Distribution & Migration and Road Kills

Mile Marker	Location	Computer Code: North of Piceance Creek	Computer Code: South (Meadows) of Piceance Creek
41	White River City	BN41	BM41
40	Piceance Bridge	BN40	BM40
39	Lower Canyon	BN39	BM39
38	Piceance Canyon	BN38	BM38
37	Yellow Creek	BN37	BM37
36	Stinking Springs	BN36	BM36
35	Old Bridge	BN35	BM35
34	Little Hills Turnoff	BN34	BM34
33	Old Corrals & Buildings	BN33	BM33
32	Burk Ranch	BN32	BM32
31	2 Ranch	BN31	BM31
30		BN30	BM30
29		BN29	BM29
28	Bureau of Mines	BN28	BM28
27	Ryan Gulch	BN27	BM27
26	Pump Station	BN26	BM26
25		BN25	BM25
24	Rock School	BN24	BM24
23	AQ 021	BN23	BM23
22	Pat Johnson's Ranch	BN22	BM22
21	Hunter Creek	BN21	BM21
20	PL Gate	BN20	BM20
19	AQ 020	BN19	BM19
18	Sorghum, Cottonwood	BN18	BM18
17	Stewart Gulch Rd.	BN17	BM17
16	A Q Trailer 022	BN16	BM16
15	Oldland's Ranch	BN15	BM15
14	Oldland's Ranch	BN14	BM14
13	Pond and Cabin	BN13	BM13
12	Sprague Gulch	BN12	BM12
11	Cascade Gulch	BN11	BM11
10	13 Mile Gulch	BN10	BM10
9	14 Mile Gulch	BN09	BM09
8	Schutte Gulch	BN08	BM08
7	Robinson's Ranch	BN07	BM07
6		BN06	BM06
5	2 Old Cabins (35 MPH Curve)	BN05	BM05
4	McCarthy Gulch	BN04	BM04
3	Cow Creek	BN03	BM03
2	Mahogany Outcropping	BN02	BM02
1	Woodward Ranch	BN01	BM01
0	Rio Blanco Store	BN00	BM00

TABLE A2.2-1 (CONTINUED)

Biology (Cont'd)

Programs	General Location	Computer Code		
Deer Mortality	North Side of Piceance Creek	BD01		
		BD02		
		BD03		
		BD04		
		BD05		
		BD06		
	South Side of Piceance Creek	BD07		
		BD08		
		BD09		
		BD10		
Deer Age Class	General Area of Tract	BE01		
Coyote Abundance	8 Transects for Total for 30 miles	BF01		
	15 mi seg. near Hunter (Control)	BF02 thru BF08		
	15 mi seg. on & South of Tract (Development)			
Lagomorph Abundance	Identical Locations to deer use days	BA01 to BA31		
Small Mammals	Piceance Creek (Development)	BG01		
	On-Tract-west	BG02		
	Piceance Creek (Control)	BG03		
	On-Tract-east	BG04		
	Sprinkler Area Section B	BG05		
	Sprinkler Area (Control)	BG11		
	Sprinkler Area (Development	BG22		
	Sprinkler Area (Control)	BG33		
Avifauna				
Songbirds and Gamebirds	N.W. of Tract-near Jimmy PJ-CH-C	BH01		
	On-Tract-Scandard PJ- -D	BH02		
	On-Tract-Cottonwood PJ-CH-D	BH03		
	S. of Tract-Between W&N Fork Stewart PJ- C	BH04		
	Sprinkler	BH05		
Raptors	The entire Tract and surrounding study areas.	BI01		
Aquatic Ecology				
Benthos	USGS 09306007 (Control)	WU07		
	USGS 09306058 (Development)	WU58		
	USGS 09306061 (Development)	WU61		
Periphyton	Piceance Creek Upstream (Control)	WP01		
		WP02		
	Piceance Creek Downstream (Development)	WP03		
Water Quality	USGS 09306061 (Development)	WU61		
Vegetation				
Community Structure	Plots	*	**	***
	Chained pinyon juniper (1978)(Dev)	BJ01	BJ11	BJ21
	Chained pinyon juniper (1978)(Cont)	BJ02	BJ12	BJ22
	Upland sagebrush (1980)(Cont)	BJ03	BJ13	BJ23
	Bottomland sagebrush (1980)(Cont)	BJ04	BJ14	BJ24
	Pinyon juniper woodland (1979)(Dev)	BJ05	BJ15	BJ25
	Pinyon juniper woodland (1979)(Cont)	BJ06	BJ16	BJ26
Herb Productivity and Utilization	Identical locations to community structure	BJ01 thru BJ26		
	Plus			
	60 range cages in random locations	BK01 thru BK60		
	10 cages on S. facing PJ for baseline	BK61 thru BK70		
	20 cages for fertilization assessment	BK71 thru BK90		
Shrub Productivity and Utilization	Same stations as Deer Days Use Study	BA01 thru BA31		
General Condition	By aircraft over entire Tract area	Not in computer		

* Fenced (8')
** Open
*** Fenced (4')

TABLE A2.2-1 (CONTINUED)

Biology (Cont'd)

Program	General Location	Computer Code
Micro Climate	MC Sta. 1	BC01
	2	BC02
	3	BC03
	4	BC04
	5	BC05
	6	BC06
	7	BC07
	8	BC08
	9	BC09
	13	BC13

III Noise

	Station Designation	Computer Code
Traffic Noise	Sta II	NA02
	IX	NA09
	XV	NB15

IV Photography

	P1	PA01
	P2	PA02
	P3	PA03
	P4	PA04
	P5	PA05
	P6	PA06
	P7	PA07
	P8	PA08
	P9	PA09
	P10	PA10
	P11	PA11
	P12	PA12
	P13	PA13
	P14	PA14
	P15	PA15
	P16	PA16
	P17	PA17
	P18	PA18
	P19	PA19
	P20	PA20
	P21	PA21
	P22	PA22
	P23	PA23
	P24	PA24
	P25	PA25
	P26	PA26
	P27	PA27
	P28	PA28
	P29	PA29
	P30	PA30
	P31	PA31
	P32	PA32
	P33	PA33
	P34	PA34
	P35	PA35

V Water

	Station Designation	Computer Code
U.S.G.S. Stream Gauging Station	09304800	WU48
	09306007	WU07
	36	WU36
	39	WU39
	42	WU42
	61	WU61
	50	WU50
	52	WU52
	58	WU58
	33	WU33
	25	WU25
	15	WU15
	28	WU28
	22	WU22
	09306200	WU00
	6222	WU62
	6255	WU55
Alluvial Wells	A-1	WA01
	A-2	WA02
	A-3	WA03
	A-4	WA04
	A-5	WA05
	A-5A	WA55
	A-6	WA06
	A-7	WA07
	A-8	WA08
	A-9	WA09
	A-10	WA10
	A-11	WA11
	A-12	WA12
	A-13	WA13
Springs and Seeps	CB S-1	WS01
	CB S-2	WS02
	CB S-3	WS03
	CB S-4	WS04
	CB S-6	WS06
	CB S-7	WS07
	CB S-8	WS08
	CB S-9	WS09
	CB S-10 (W-3)	WS10 (WS34)
	CB Seep A	WS11
	CER-1	WS21
	B-3	WS22
	H-3	WS23
	F-3	WS24
	Figure 4-A	WS25
	W-4	WS26
	W-9	WS27
	CER-7	WS28
	S-9	WS29
	P3 & P3A	WS30
	CER-6	WS31
	W-2	WS32
	S-2	WS33
	W-3 (CB S-10)	WS34 (WS10)
	Figure 4	WS35
Precipitation	CB-020	AB20
	CB-023	AB23
	LH	WR01
	M	WR02
	SG	WR03
	CG	WR04
	JQS	WR05
	EFPC	WR06
	EMFPC	WR07

TABLE A2.2-1 (CONTINUED)

Water (Cont'd)

Upper Aquifer Wells

Before Recompletions Station	Before Recompletions Code	After Recompletions Station	After Recompletions Code
CB-2	WX02		
CB-4	WX04		
SG-10A	WX10		
SG-1A	WX11		
SG-1-2	WX12		
SG-17-2	WX17		
SG-18A	WX18		
SG-19	WX19		
SG-20	WX20		
SG-21	WX21		
AT-1C-3	WX44		
SG-11-3	WX55		
SG-6-3	WX63		
SG-8-2	WX82		
SG-9-2	WX92		
32X-12	WX32		
33X-1	WX33		
41X-1	WX41		
TH75-5A	WX64		
TH75-13A	WX65		
TH75-18A	WX67		
TH75-9A	WX69		
CER RB-D-02	WX71		
TH75-15A	WX72		
UNION 8-1	WX73		
COLONY 12-596	WX74		

Lower Aquifer Wells

Before Recompletions Station	Before Recompletions Code	After Recompletions Station	After Recompletions Code
CB-1	WY01		
SG-10	WY09	SG-10R	WY10
SG-1-1	WY12		
SG-17-1	WY18	SG-17-1R	WY17
AT-1C-1	WY45		
AT-1C-2	WY46		
SG-11-1	WY51	SG-11-1R	WY52
SG-11-2	WY54		
SG-6-1	WY61		
SG-6-2	WY62		
SG-8	WY80	SG-8R	WY81
SG-9-1	WY91		
AT-1	WY44		
TH75-5B	WY64		
TH75-13B	WY65		
EQUITY-1	WY66		
TH75-18B	WY67		
TH75-1ØB	WY68		
TH75-9B	WY69		
EQUITY-SULFUR-1A	WY70		
CER RB-D-Ø3	WY71		
TH75-15B	WY72		
TG71-3	WY75		
TG71-5	WY76		
GETTY 9-4D	WY77		
TG71-4	WY78		
EQUITY BS-13	WY79		

TABLE A2.2-1

Computer Code and Station I.D. Cross-Reference

V. Water (cont'd)

	Station	Code	Elevation	
Composite Wells:				
	GREENO 404	WV01	6411.0	
	OLDLAND 3	WV02	6490.0	
	GP-17X-BG	WV03	6729.0	
	BUTE 25	WV04	0000.0	
	LIBERTY BELL 12	WV05	7420.0	
Seepage Monitoring Wells:				
	31X-12	WW12	0000.0	11-26-80 31X-12 WW22
	41X-13-2	WW13	0000.0	
Reinjection Wells:				
	11X-18	WI18	6950.0	
Ponds:				
	POND A	WN01		
	POND B	WN02		
	POND C	WN03		
	POND A SPRINGS	WN11		
	POND B SPRINGS	WN12		
	POND C SPRINGS	WN13		
	POND A INLET	WN21		
	POND B INLET	WN22		
	POND C INLET	WN23		
	POND A-B CROSSOVER	WN31		
	POND B OUTLET	WN32		
	POND C OUTLET	WN33		
	BACKWASH POND	WN04		
	BACKWASH POND SPRINGS	WN14		
	BACKWASH POND INLET	WN24		
	BACKWASH POND OUTLET	WN34		
	POND A-B DISCHARGE	WN40		
Shafts:				
	V/E SHAFT PROBE HOLES	WZ01		
	SERVICE SHAFT PROBE HOLES	WZ02		
	PRODUCTION SHAFT PROBE HOLES	WZ03		
	V/E SHAFT WATER RING	WZ11		
	SERVICE SHAFT WATER RING	WZ12		
	PRODUCTION SHAFT WATER RING	WZ13		
	V/E SHAFT SUMP	WZ21		
	SERVICE SHAFT SUMP	WZ22		
	PRODUCTION SHAFT SUMP	WZ23		
	V/E SHAFT	WZ31		
	PRODUCTION SHAFT	WZ33		
	SHAFT GROUT HOLE	WZ41		
Discharge Monitoring Stations				
	NO NAME GULCH	WU42		
	UPPER PICEANCE CREEK	WN41		
	LOWER PICEANCE CREEK	WN42		
	HUNTER CREEK	WU02		

CHAPTER 4.0

Tract Photography

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	35.00	DISPLAYED	W
FROM	36.00	TO	39.00	DISPLAYED	N
FROM	40.00	TO	42.00	DISPLAYED	$
FROM	43.00	TO	45.00	DISPLAYED	U
FROM	46.00	TO	47.00	DISPLAYED	*
FROM	48.00	TO	49.00	DISPLAYED	=
FROM	50.00	TO	53.00	DISPLAYED	+
FROM	54.00	TO	57.00	DISPLAYED	-
FROM	58.00	TO	65.00	DISPLAYED	.
FROM	66.00	TO	256.00	DISPLAYED	

FIGURE A4.2.5-1

Unfiltered graymap of MSS Band 7 for the test area.

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	35.00	DISPLAYED	M
FROM	36.00	TO	39.00	DISPLAYED	N
FROM	40.00	TO	42.00	DISPLAYED	$
FROM	43.00	TO	45.00	DISPLAYED	U
FROM	46.00	TO	47.00	DISPLAYED	*
FROM	48.00	TO	49.00	DISPLAYED	=
FROM	50.00	TO	53.00	DISPLAYED	+
FROM	54.00	TO	57.00	DISPLAYED	-
FROM	58.00	TO	65.00	DISPLAYED	.
FROM	66.00	TO	256.00	DISPLAYED	

FIGURE A4.2.5-2

MA filtered graymap of MSS Band 7 for the test area.

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	35.00	DISPLAYED	W
FROM	36.00	TO	39.00	DISPLAYED	N
FROM	40.00	TO	42.00	DISPLAYED	$
FROM	43.00	TO	45.00	DISPLAYED	U
FROM	46.00	TO	47.00	DISPLAYED	+
FROM	48.00	TO	49.00	DISPLAYED	=
FROM	50.00	TO	53.00	DISPLAYED	+
FROM	54.00	TO	57.00	DISPLAYED	-
FROM	58.00	TO	65.00	DISPLAYED	.
FROM	66.00	TO	256.00	DISPLAYED	

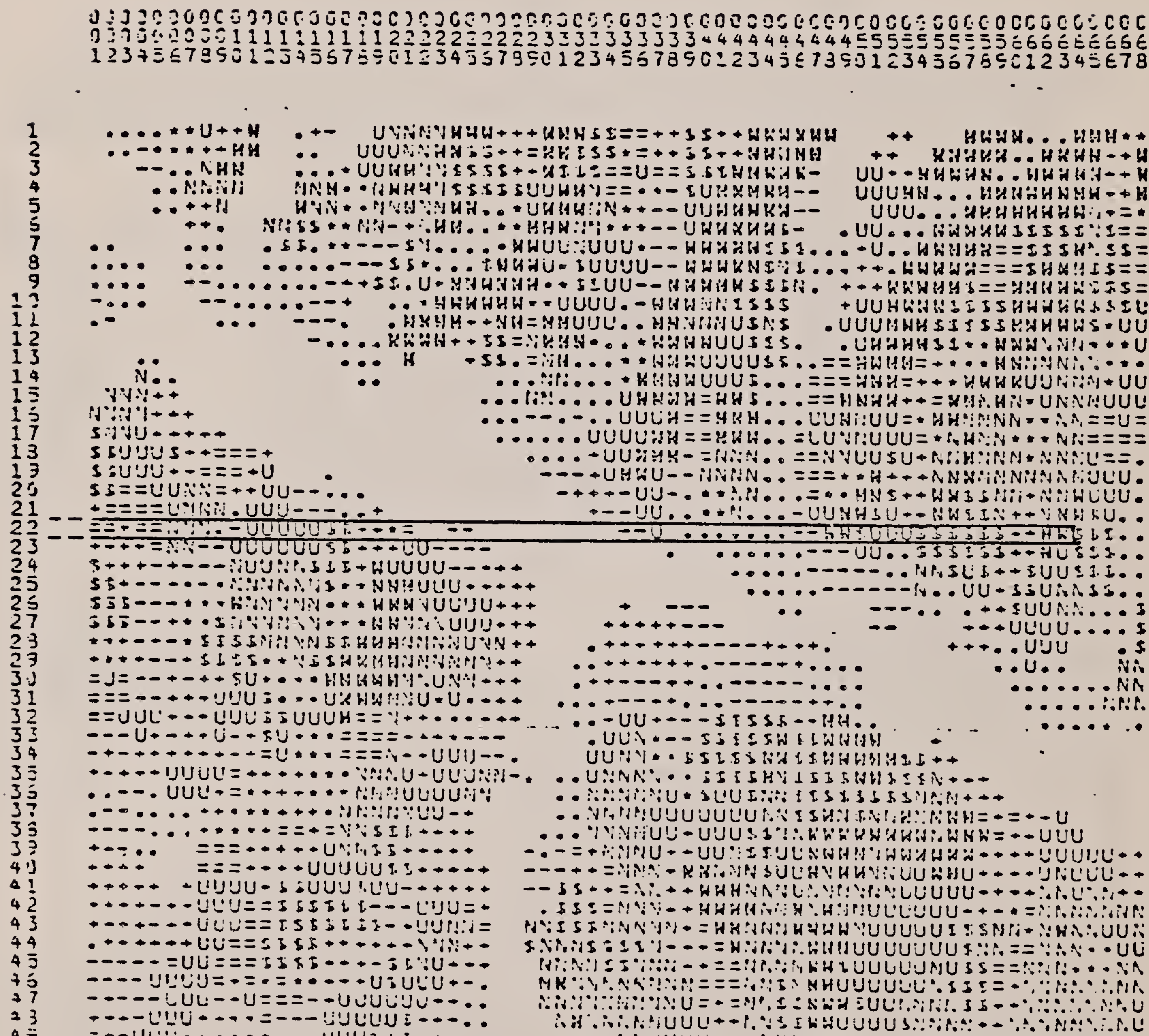
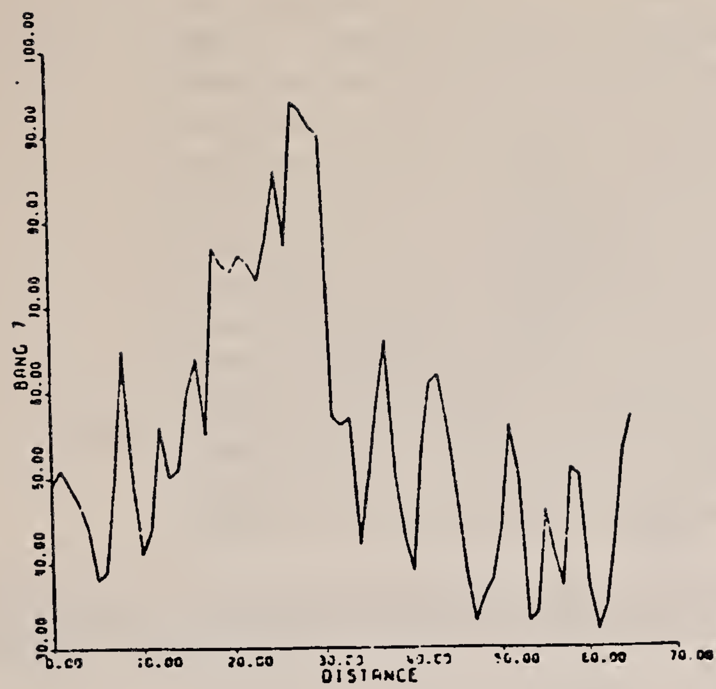
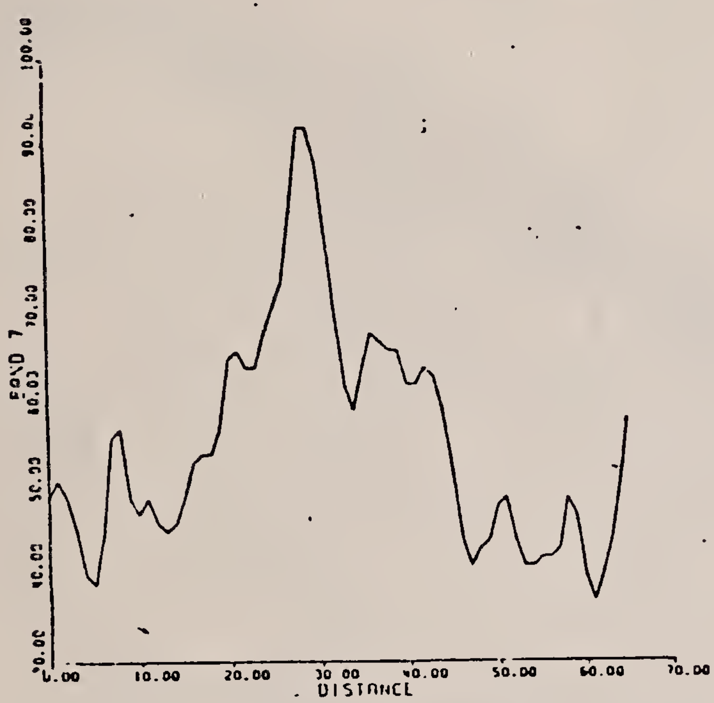


FIGURE A4.2.5-3

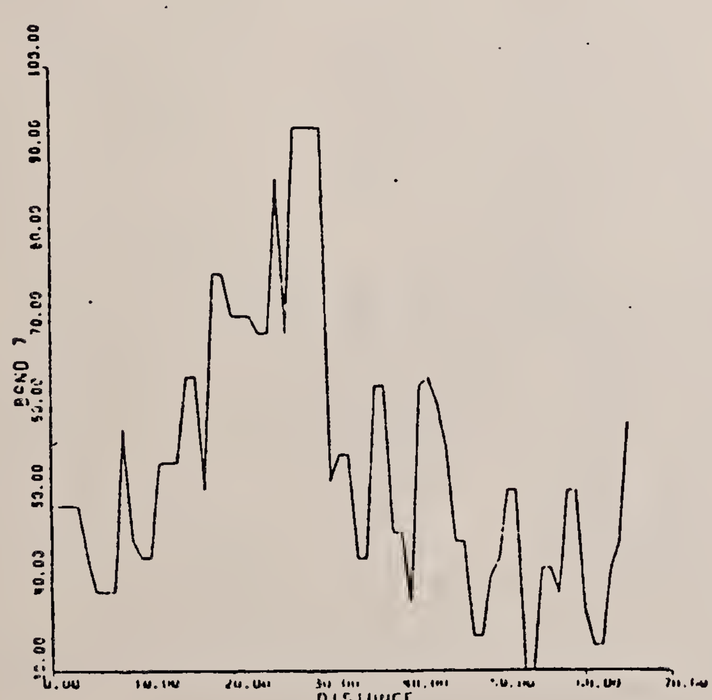
MV filtered graymap for MSS Band 7 for the test area.



(a)



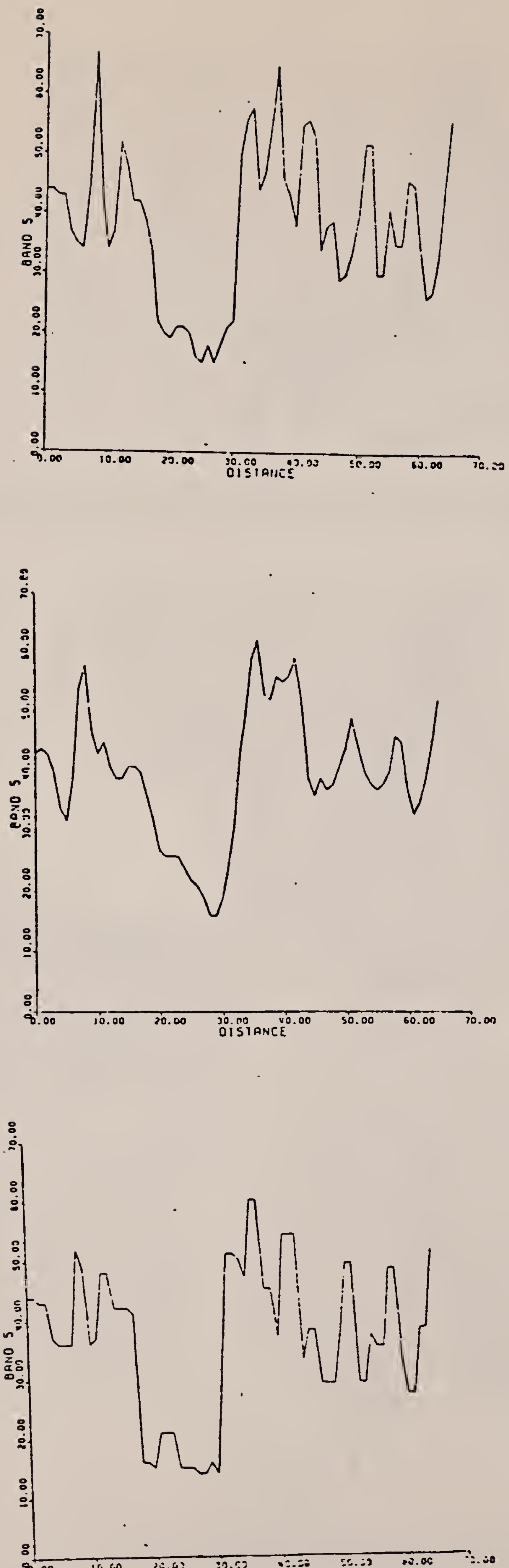
(b)



(c)

FIGURE A4.2.5-4

A plot of MSS Band 7 values along the transect shown on Figures A4.2.5-1,-2,-3 - a, b, and c, respectively represent unfiltered, MA filtered and MV filtered data.



(a)

(b)

(c)

FIGURE A4.2.5-5

A plot of MSS Band 5 values for the transect, representing unfiltered, MA filtered and MV filtered data a, b, and c, respectively.

THE CHARACTER SET USED FOR DISPLAY IS GREEN BIOMASS (KG/HA)

FROM	0.00	TO	90.00	DISPLAYED	W	0 (WATER)
FROM	91.00	TO	121.00	DISPLAYED		0 (BARE SOIL)
FROM	122.00	TO	125.00	DISPLAYED	.	0 - 175
FROM	126.00	TO	130.00	DISPLAYED	+	175 -475
FROM	131.00	TO	137.00	DISPLAYED	•	475 - 800
FROM	138.00	TO	147.00	DISPLAYED	=	800 - 1525
FROM	148.00	TO	157.00	DISPLAYED	▬	1525 - 2950
FROM	158.00	TO	169.00	DISPLAYED	*	2950 - 6300
FROM	170.00	TO	180.00	DISPLAYED	O	6300 - 10900
FROM	181.00	TO	191.00	DISPLAYED	θ	10900 - 13000
FROM	192.00	TO	202.00	DISPLAYED	⊖	> 13000
FROM	203.00	TO	213.00	DISPLAYED	●	> 13000
FROM	214.00	TO	256.00	DISPLAYED	■	> 13000

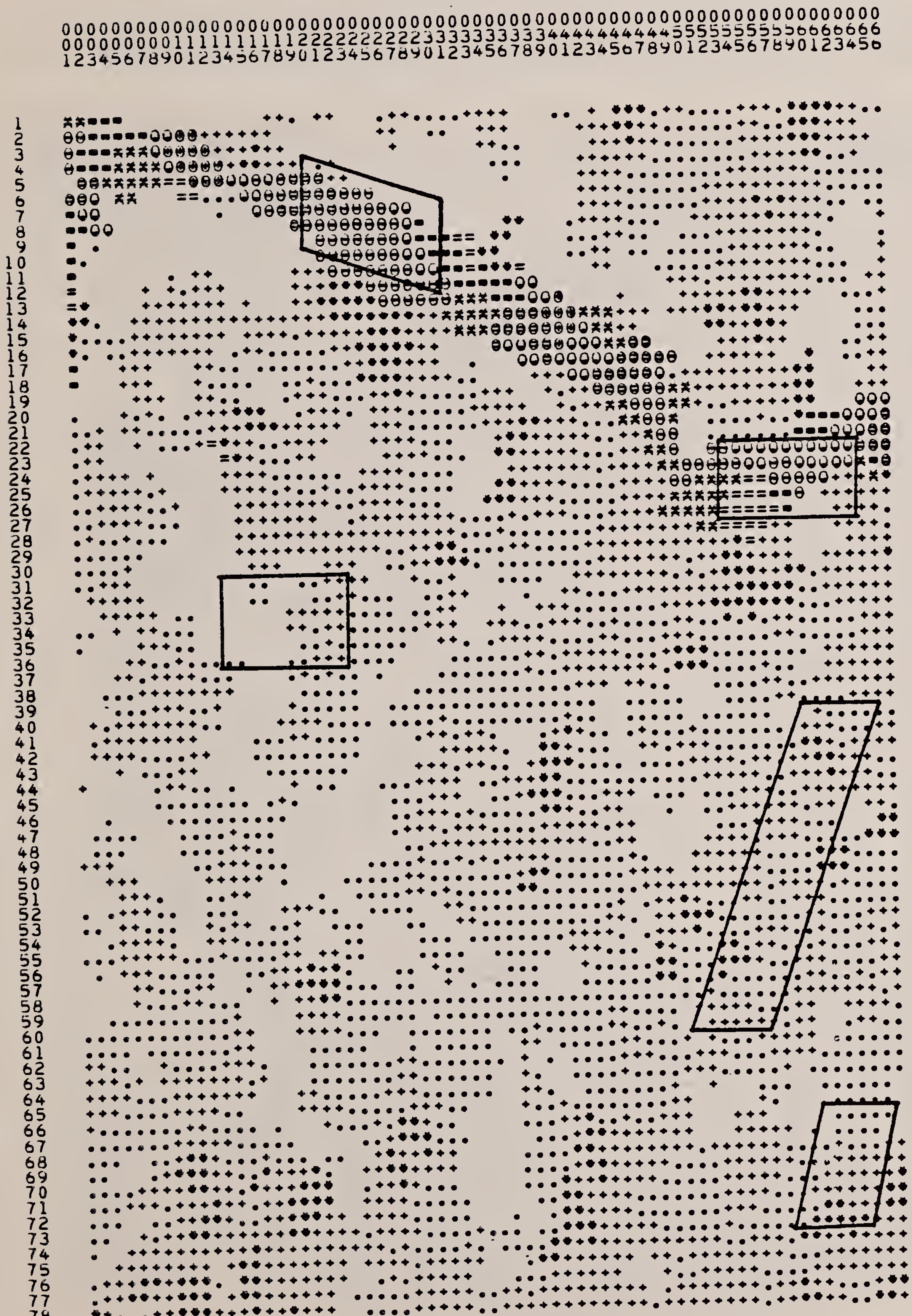


FIGURE A4.2.5-6

Graymap of Vegetation Index (Normalized Difference) August, 1977 Image Date

THE CHARACTER SET USED FOR DISPLAY IS GREEN BIOMASS (KG/HA)

FROM	0.00	TO	90.00	DISPLAYED	W	0 (WATER)
FROM	91.00	TO	121.00	DISPLAYED		0 (BARE SOIL)
FROM	122.00	TO	125.00	DISPLAYED	.	0 - 175
FROM	126.00	TO	130.00	DISPLAYED	+	175 -475
FROM	131.00	TO	137.00	DISPLAYED	◆	475 - 800
FROM	138.00	TO	147.00	DISPLAYED	=	800 - 1525
FROM	148.00	TO	157.00	DISPLAYED	▪	1525 - 2950
FROM	158.00	TO	169.00	DISPLAYED	✱	2950 - 6300
FROM	170.00	TO	180.00	DISPLAYED	Θ	6300 - 10900
FROM	181.00	TO	191.00	DISPLAYED	θ	10900 - 13000
FROM	192.00	TO	202.00	DISPLAYED	⊖	> 13000
FROM	203.00	TO	213.00	DISPLAYED	●	> 13000
FROM	214.00	TO	256.00	DISPLAYED	■	> 13000

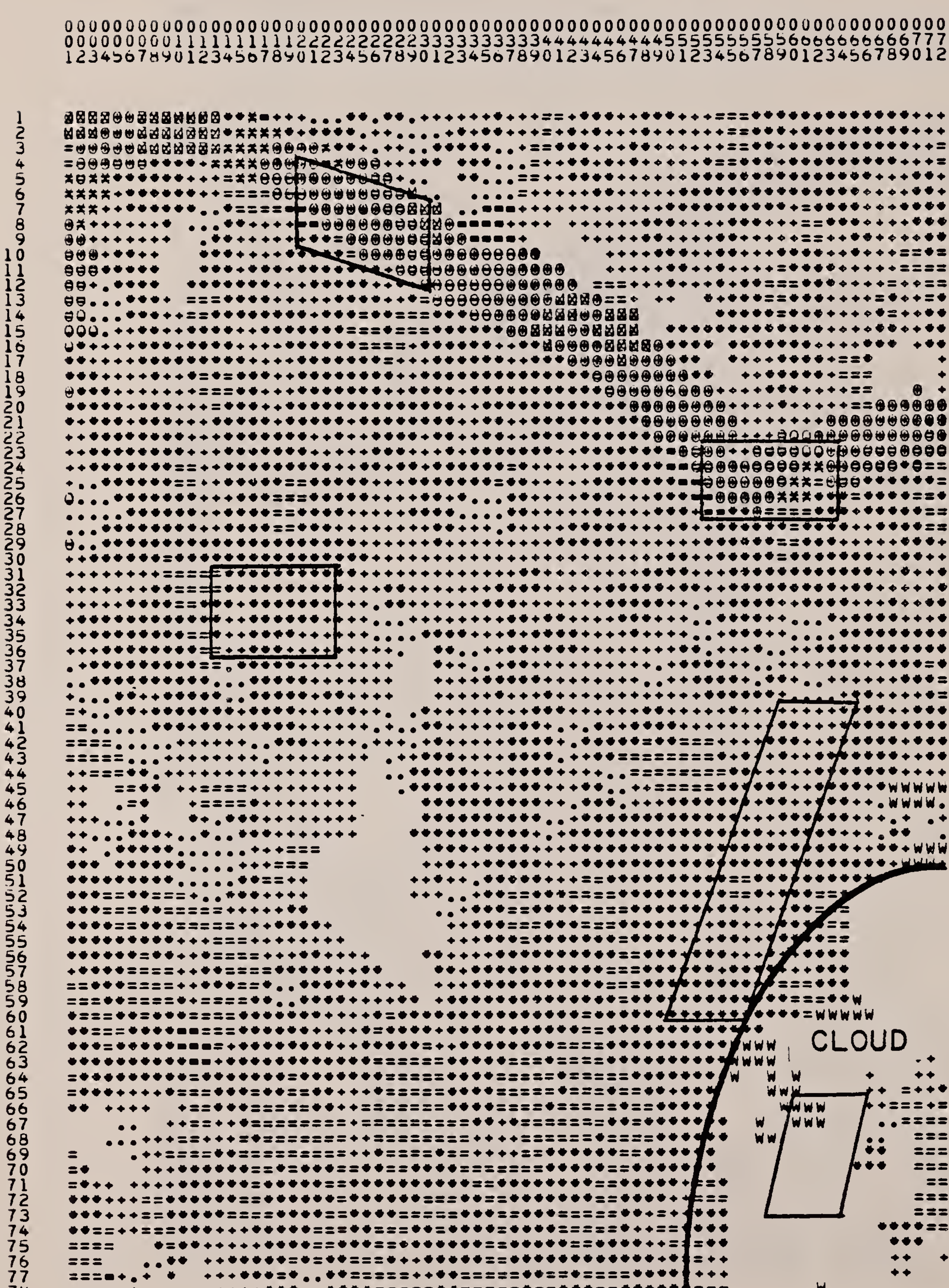


FIGURE A4.2.5-7

Graymap of Vegetation Index (Normalized Difference) June, 1979 Image Date

THE CHARACTER SET USED FOR DISPLAY IS GREEN BIOMASS (KG/HA)

FROM	0.00	TO	90.00	DISPLAYED	W	0 (WATER)
FROM	91.00	TO	121.00	DISPLAYED		0 (BARE SOIL)
FROM	122.00	TO	125.00	DISPLAYED	.	0 - 175
FROM	126.00	TO	130.00	DISPLAYED	+	175 -475
FROM	131.00	TO	137.00	DISPLAYED	*	475 - 800
FROM	138.00	TO	147.00	DISPLAYED	=	800 - 1525
FROM	148.00	TO	157.00	DISPLAYED	▪	1525 - 2950
FROM	158.00	TO	169.00	DISPLAYED	X	2950 - 6300
FROM	170.00	TO	180.00	DISPLAYED	O	6300 - 10900
FROM	181.00	TO	191.00	DISPLAYED	θ	10900 - 13000
FROM	192.00	TO	202.00	DISPLAYED	⊖	> 13000
FROM	203.00	TO	213.00	DISPLAYED	●	> 13000
FROM	214.00	TO	256.00	DISPLAYED	▮	> 13000

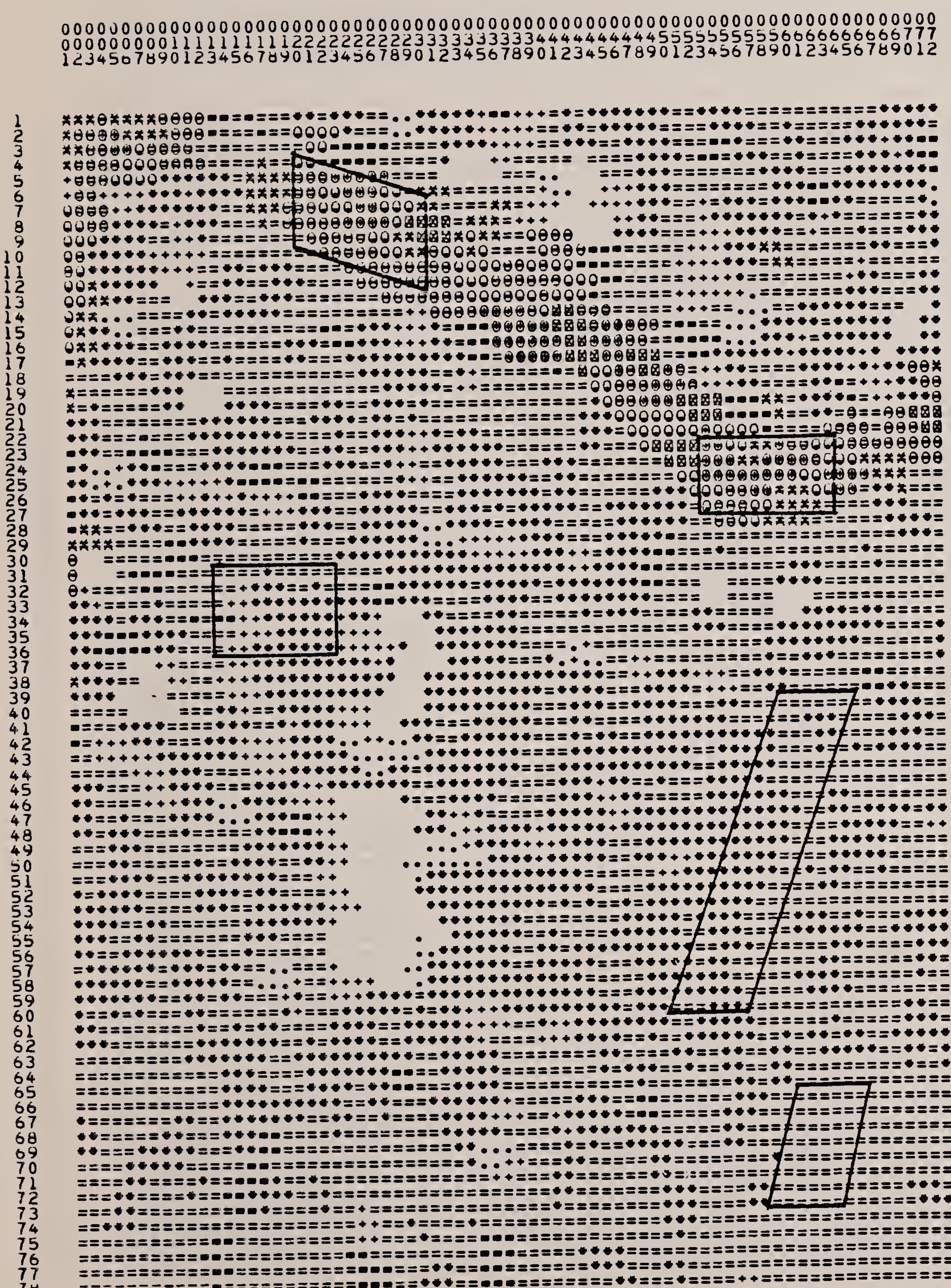


FIGURE A4.2.5-8

Graymap of Vegetation Index (Normalized Difference) August, 1979 Image Date

THE CHARACTER SET USED FOR DISPLAY IS GREEN BIOMASS (KG/HA)

FROM	0.00	TO	90.00	DISPLAYED	*	0 (WATER)
FROM	91.00	TO	121.00	DISPLAYED		0 (BARE SOIL)
FROM	122.00	TO	125.00	DISPLAYED	.	0 - 175
FROM	126.00	TO	130.00	DISPLAYED	+	175 -475
FROM	131.00	TO	137.00	DISPLAYED	◆	475 - 800
FROM	138.00	TO	147.00	DISPLAYED	=	800 - 1525
FROM	148.00	TO	157.00	DISPLAYED	▬	1525 - 2950
FROM	158.00	TO	169.00	DISPLAYED	x	2950 - 6300
FROM	170.00	TO	180.00	DISPLAYED	O	6300 - 10900
FROM	181.00	TO	191.00	DISPLAYED	θ	10900 - 13000
FROM	192.00	TO	202.00	DISPLAYED	⊖	> 13000
FROM	203.00	TO	213.00	DISPLAYED	●	> 13000
FROM	214.00	TO	256.00	DISPLAYED	■	> 13000

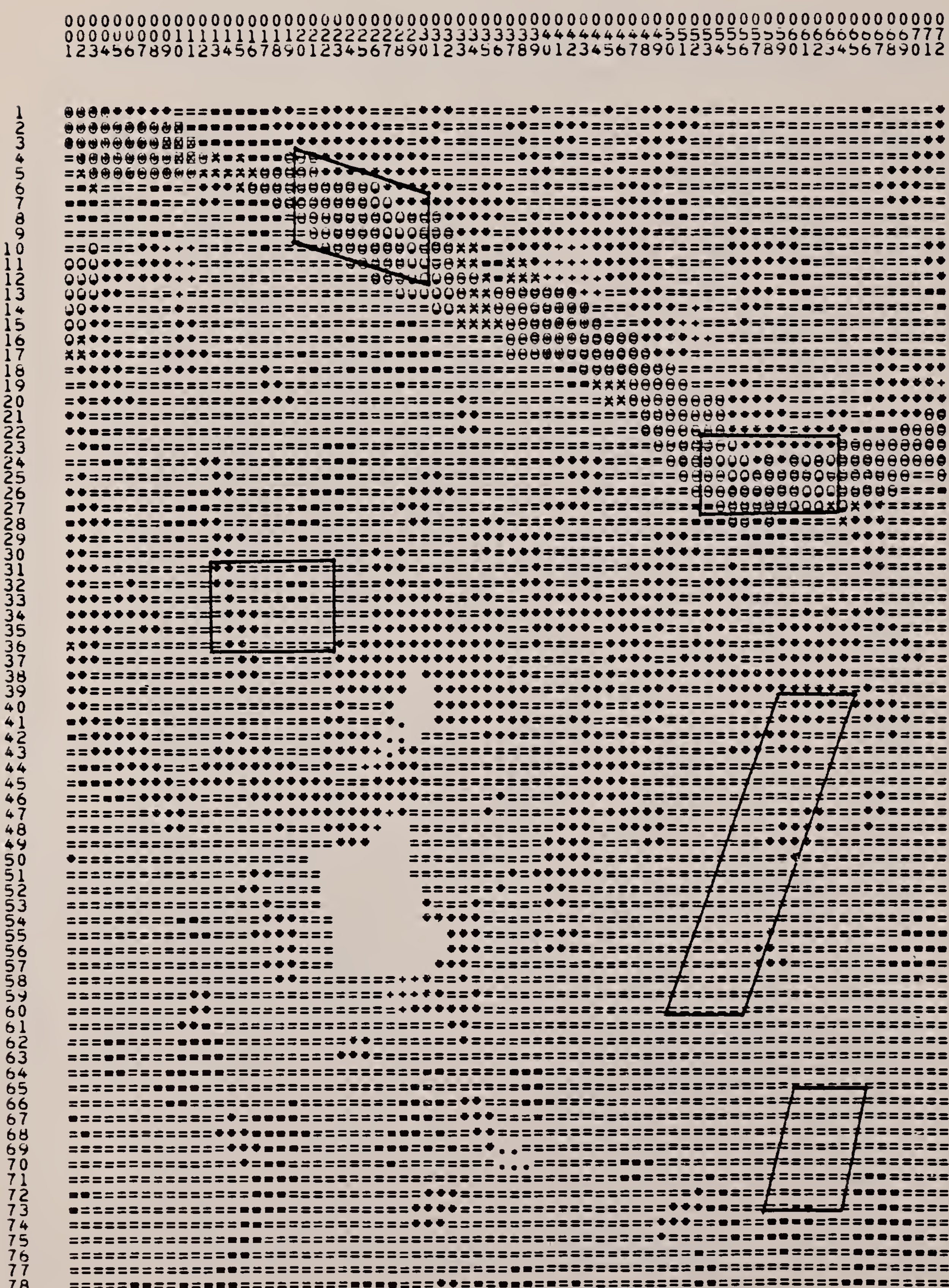


FIGURE A4.2.5-9

Graymap of Vegetation Index (Normalized Difference) June, 1980 Image Date

THE CHARACTER SET USED FOR DISPLAY IS GREEN BIOMASS (KG/HA)

FROM	0.00	TO	90.00	DISPLAYED	W	0 (WATER)
FROM	91.00	TO	121.00	DISPLAYED		0 (BARE SOIL)
FROM	122.00	TO	125.00	DISPLAYED	.	0 - 175
FROM	126.00	TO	130.00	DISPLAYED	+	175 -475
FROM	131.00	TO	137.00	DISPLAYED	◆	475 - 800
FROM	138.00	TO	147.00	DISPLAYED	=	800 - 1525
FROM	148.00	TO	157.00	DISPLAYED	■	1525 - 2950
FROM	158.00	TO	169.00	DISPLAYED	*	2950 - 6300
FROM	170.00	TO	180.00	DISPLAYED	O	6300 - 10900
FROM	181.00	TO	191.00	DISPLAYED	θ	10900 - 13000
FROM	192.00	TO	202.00	DISPLAYED	●	> 13000
FROM	203.00	TO	213.00	DISPLAYED	●	> 13000
FROM	214.00	TO	256.00	DISPLAYED	■	> 13000

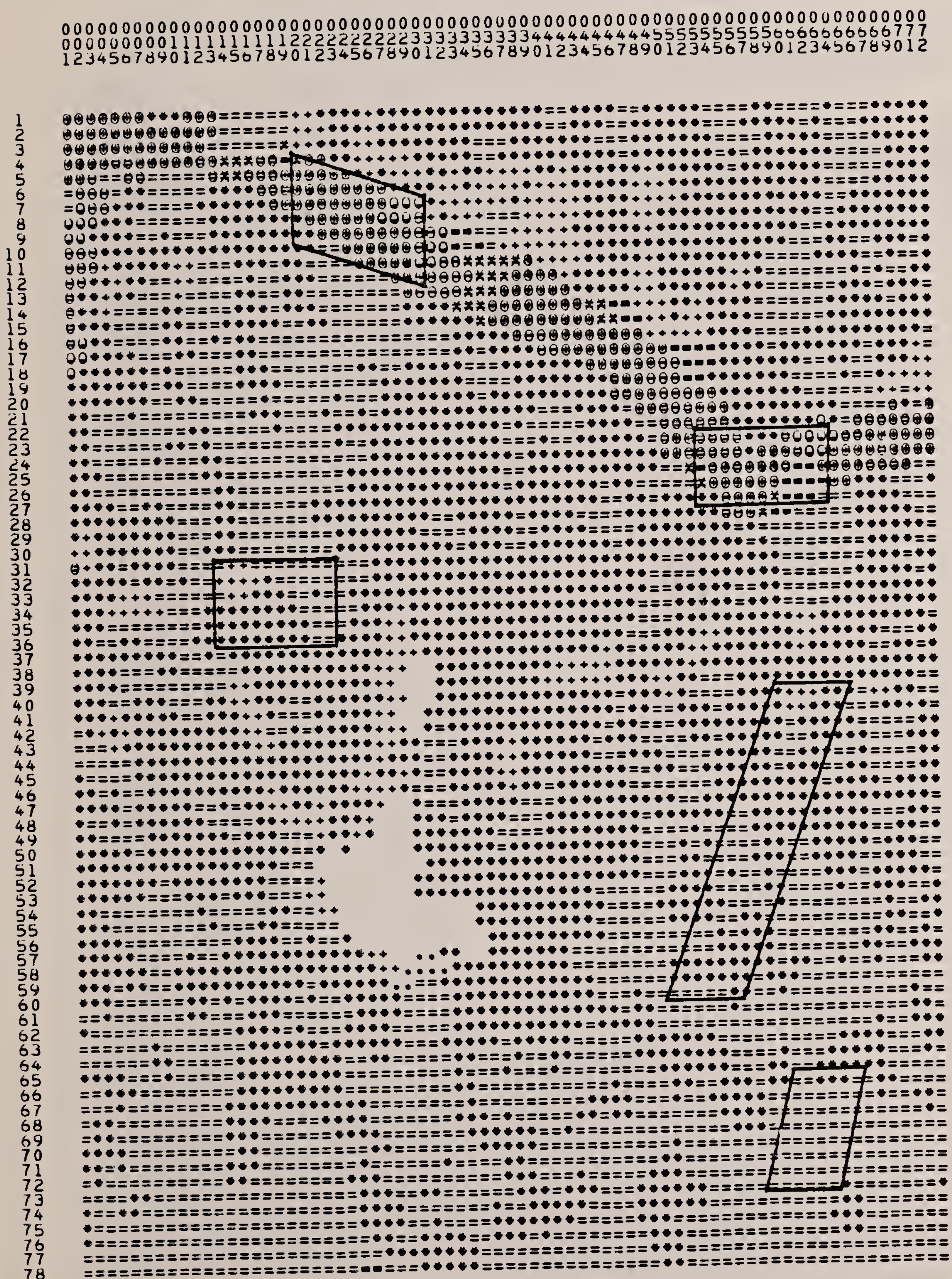


FIGURE A4.2.5-10

Graymap of Vegetation Index (Normalized Difference) July, 1980 Image Date

THE CHARACTER SET USED FOR DISPLAY IS GREEN BIOMASS (KG/HA)

FROM	0.00	TO	90.00	DISPLAYED	W	0 (WATER)
FROM	91.00	TO	121.00	DISPLAYED		0 (BARE SOIL)
FROM	122.00	TO	125.00	DISPLAYED	.	0 - 175
FROM	126.00	TO	130.00	DISPLAYED	+	175 -475
FROM	131.00	TO	137.00	DISPLAYED	◆	475 - 800
FROM	138.00	TO	147.00	DISPLAYED	=	800 - 1525
FROM	148.00	TO	157.00	DISPLAYED	▬	1525 - 2950
FROM	158.00	TO	169.00	DISPLAYED	x	2950 - 6300
FROM	170.00	TO	180.00	DISPLAYED	O	6300 - 10900
FROM	181.00	TO	191.00	DISPLAYED	θ	10900 - 13000
FROM	192.00	TO	202.00	DISPLAYED	⊖	> 13000
FROM	203.00	TO	213.00	DISPLAYED	●	> 13000
FROM	214.00	TO	256.00	DISPLAYED	■	> 13000

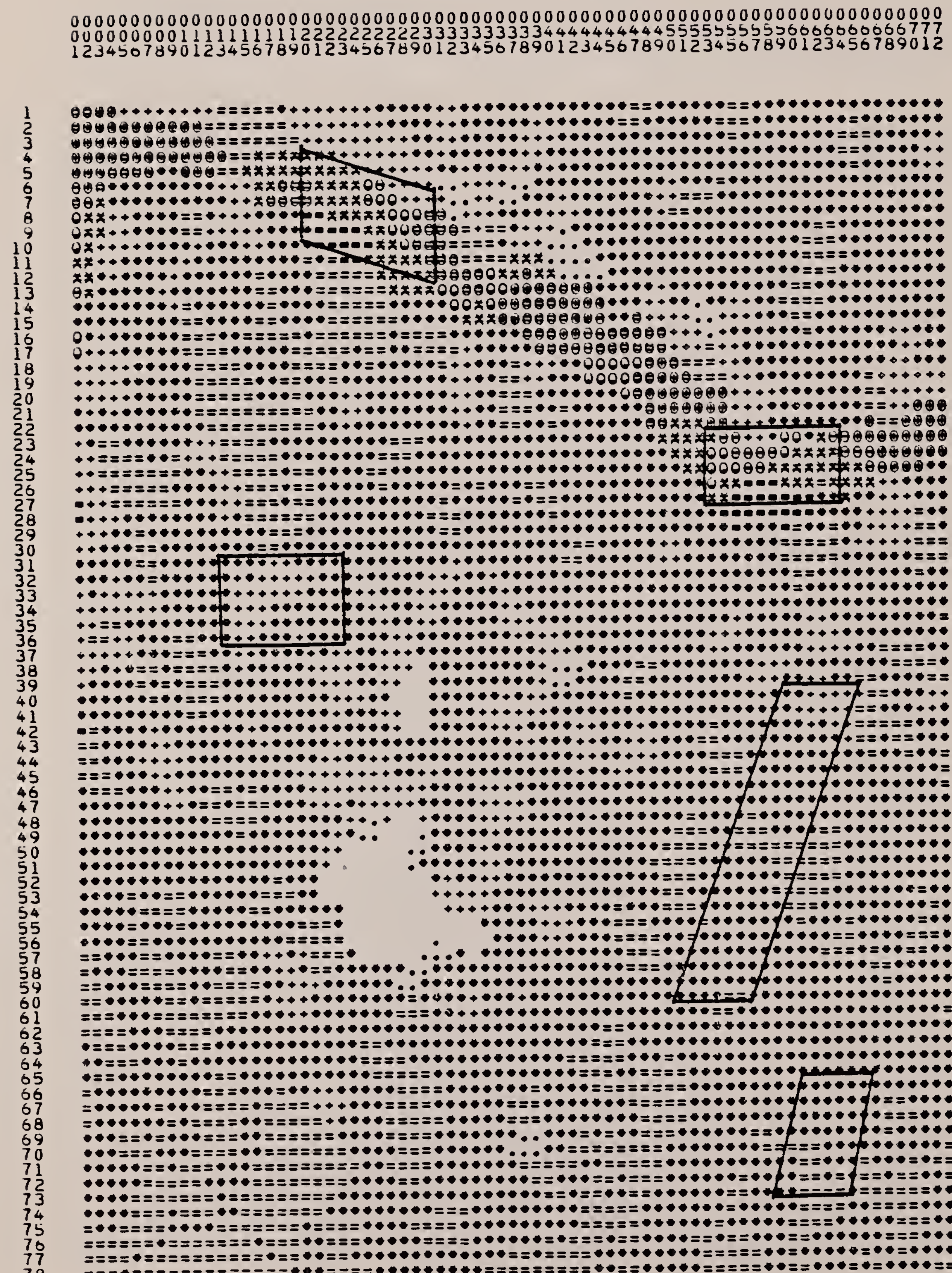


FIGURE A4.2.5-11

Graymap of Vegetation Index (Normalized Difference) August, 1980 Image Date

THE CHARACTER SET USED FOR DISPLAY IS					GREEN BIOMASS (KG/HA)
FROM	0.00	TO	90.00	DISPLAYED w	0 (WATER)
FROM	91.00	TO	121.00	DISPLAYED	0 (BARE SOIL)
FROM	122.00	TO	125.00	DISPLAYED .	0 - 175
FROM	126.00	TO	130.00	DISPLAYED +	175 -475
FROM	131.00	TO	137.00	DISPLAYED *	475 - 800
FROM	138.00	TO	147.00	DISPLAYED =	800 - 1525
FROM	148.00	TO	157.00	DISPLAYED ▬	1525 - 2950
FROM	158.00	TO	169.00	DISPLAYED ¤	2950 - 6300
FROM	170.00	TO	180.00	DISPLAYED 0	6300 - 10900
FROM	181.00	TO	191.00	DISPLAYED θ	10900 - 13000
FROM	192.00	TO	202.00	DISPLAYED ●	> 13000
FROM	203.00	TO	213.00	DISPLAYED ●	> 13000
FROM	214.00	TO	256.00	DISPLAYED ▣	> 13000

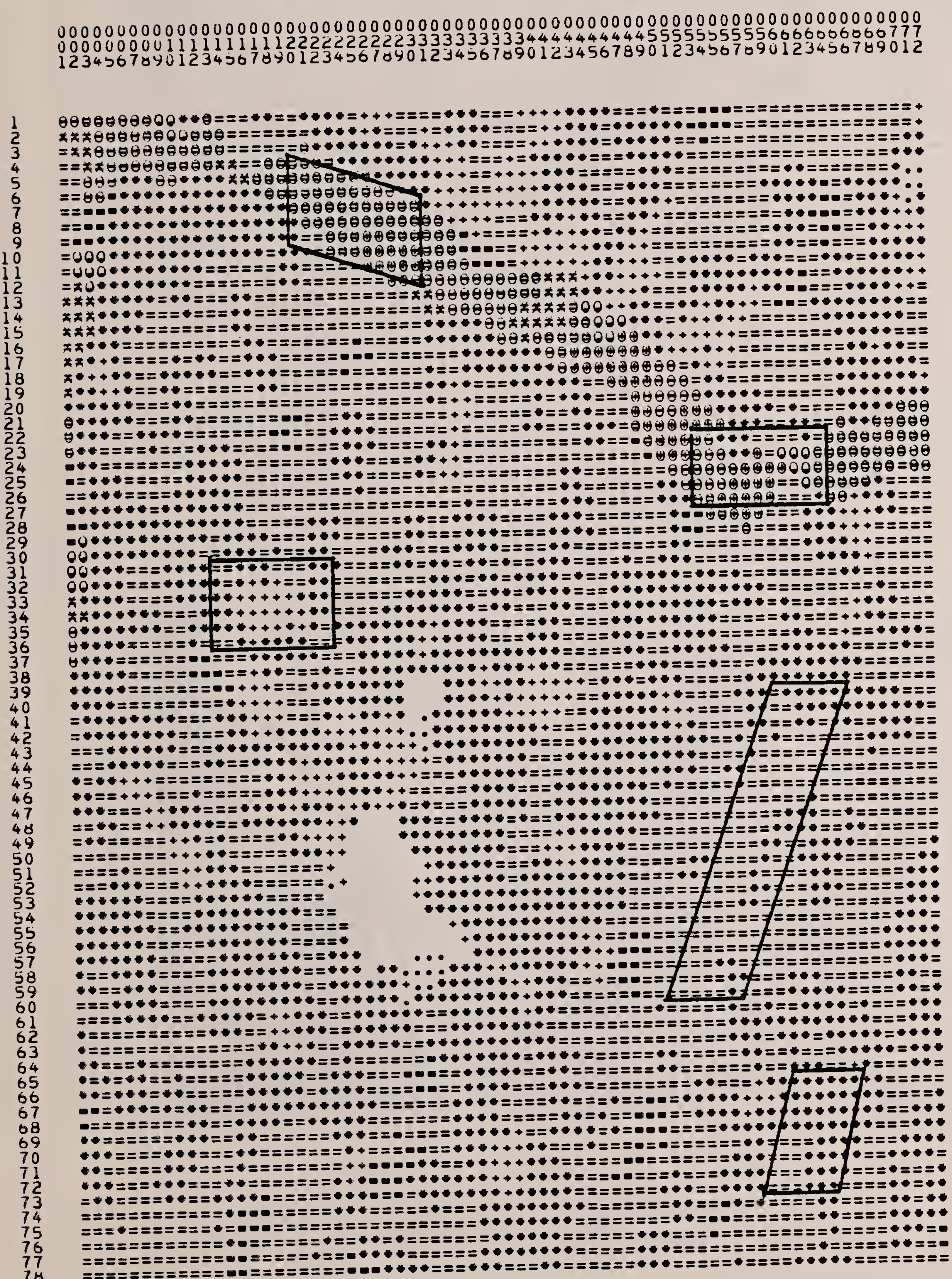


FIGURE A4.2.5-12

Graymap of Vegetation Index (Normalized Difference) September, 1980 Image Date

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	=	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

FIGURE A4.2.5-13

Graymap of Change Detection
June 1977 - June 1979 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	=	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	I	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

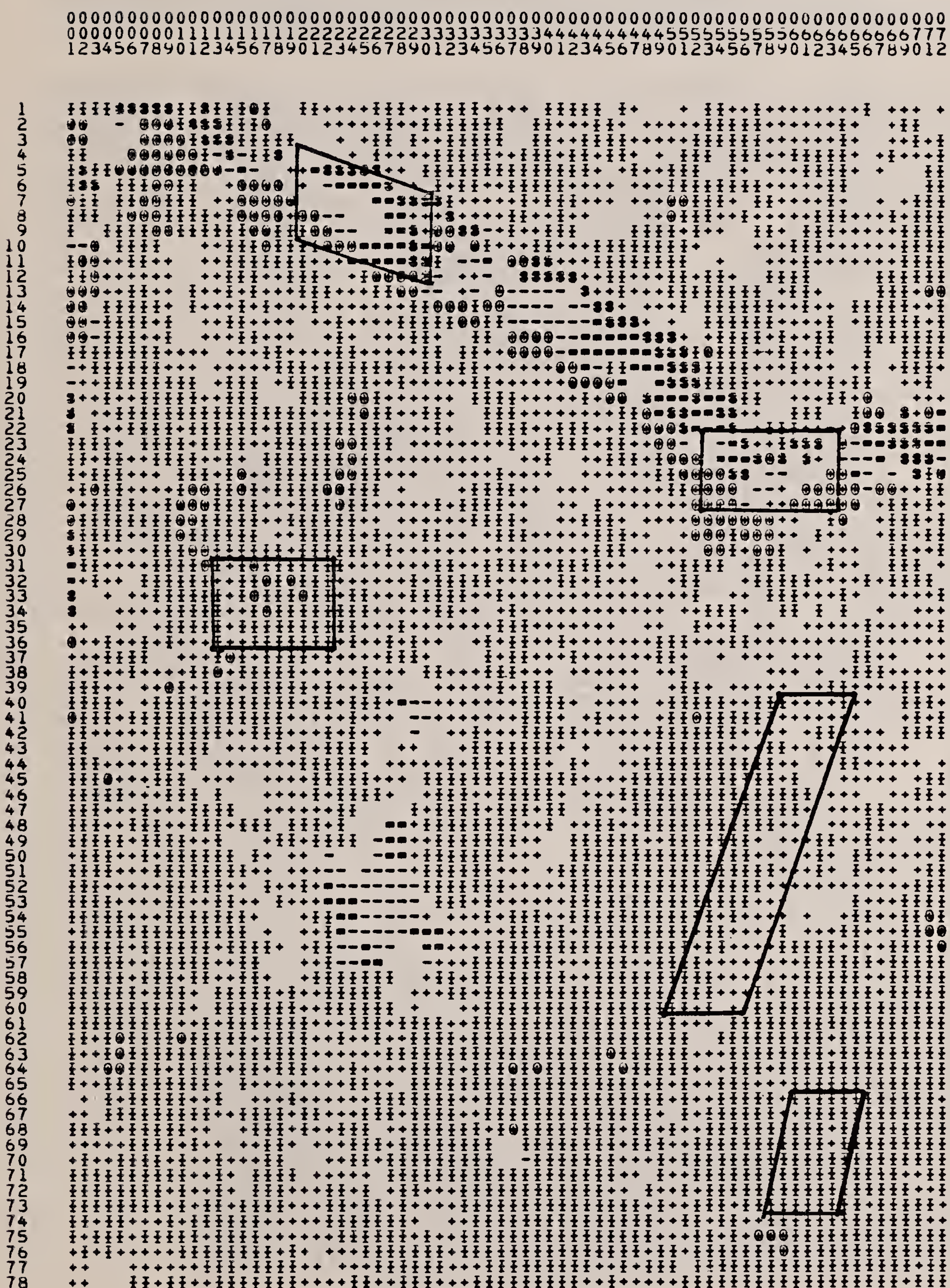


FIGURE A4.2.5-14

Graymap of Change Detection
June 1977 - June 1980 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	=	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	●	POSITIVE - STRONG

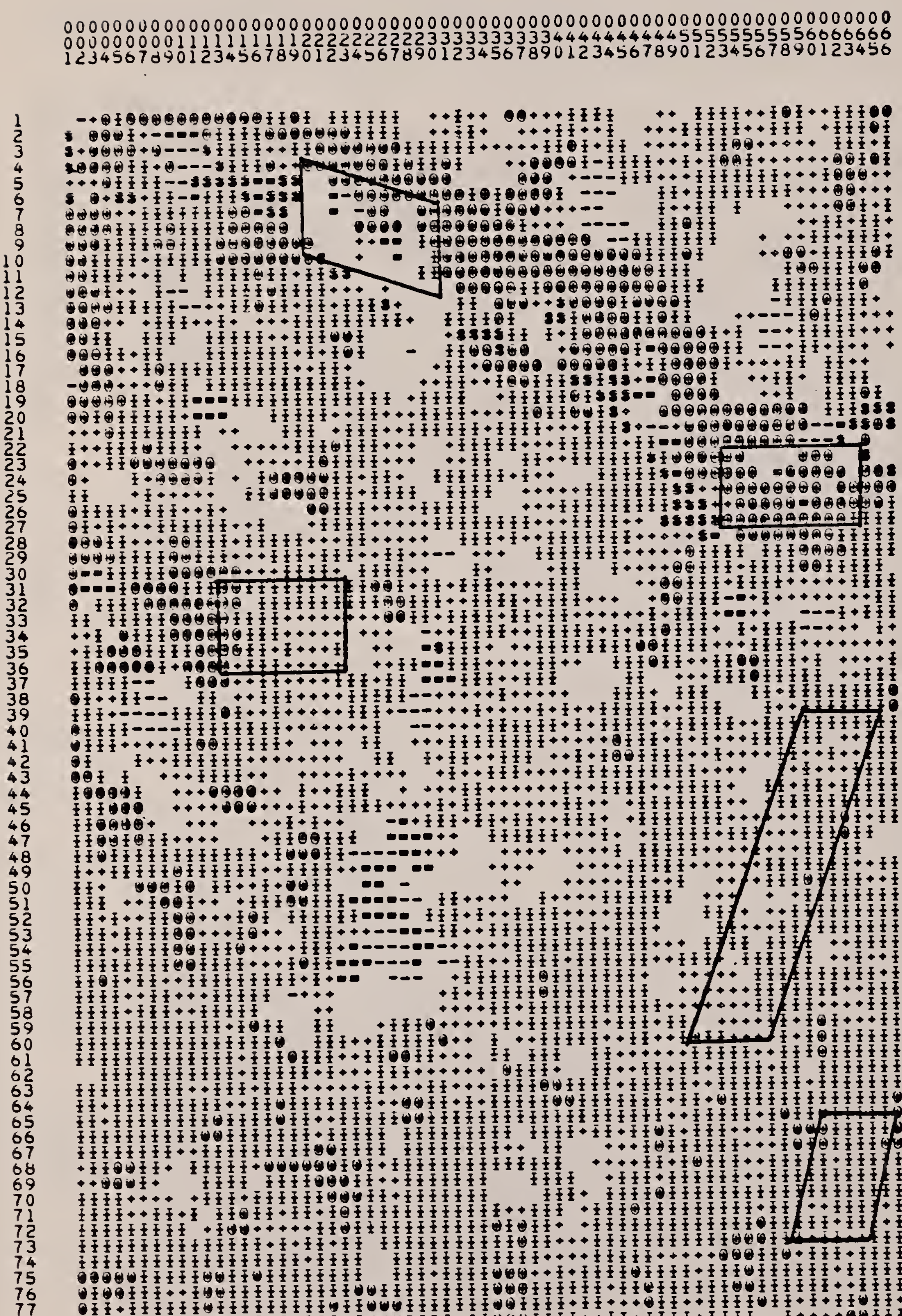


FIGURE A4.2.5-15

Graymap of Change Detection
August 1977 - August 1979 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	=	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

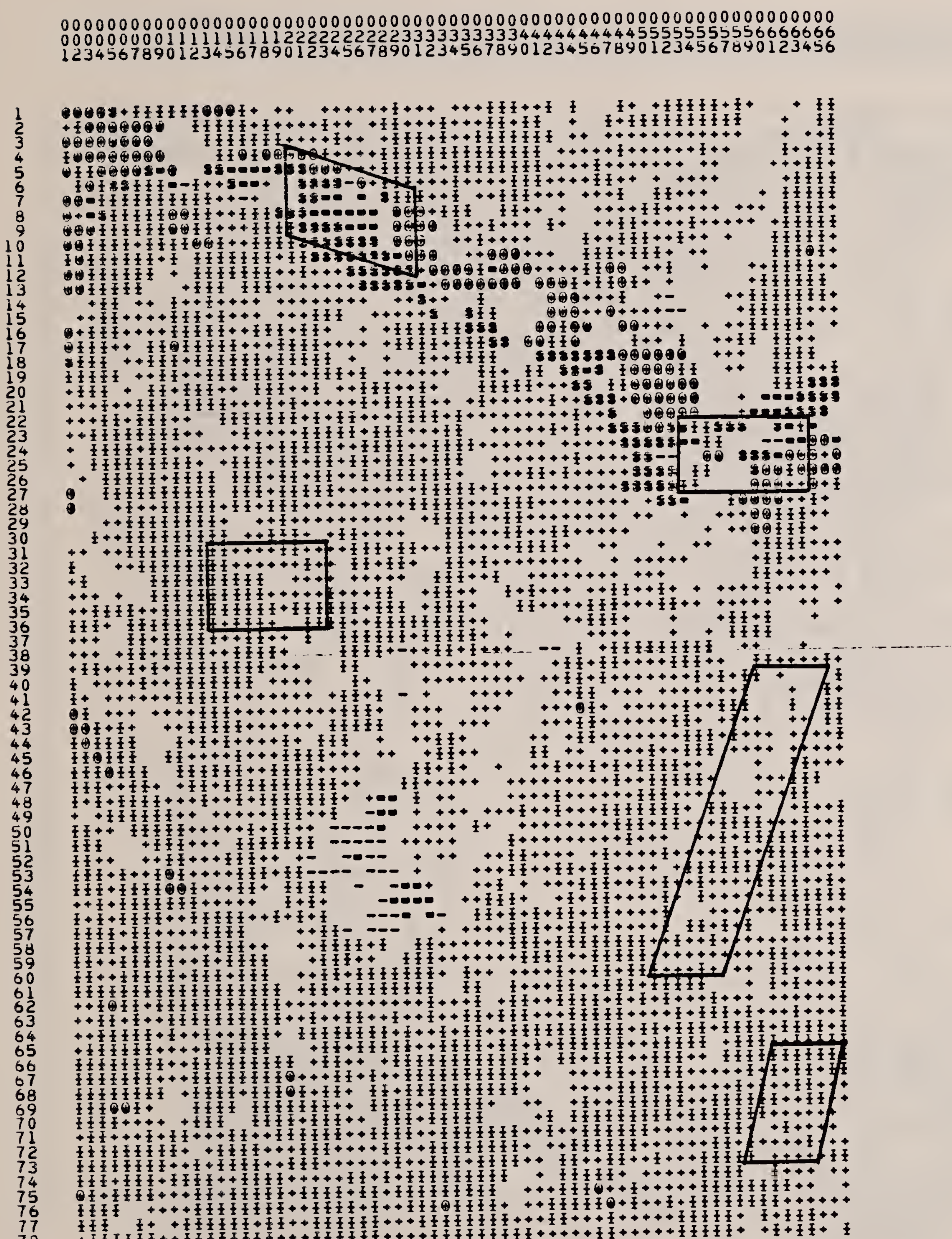


FIGURE A4.2.5-16

Graymap of Change Detection
August 1977 - August 1980 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	=	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

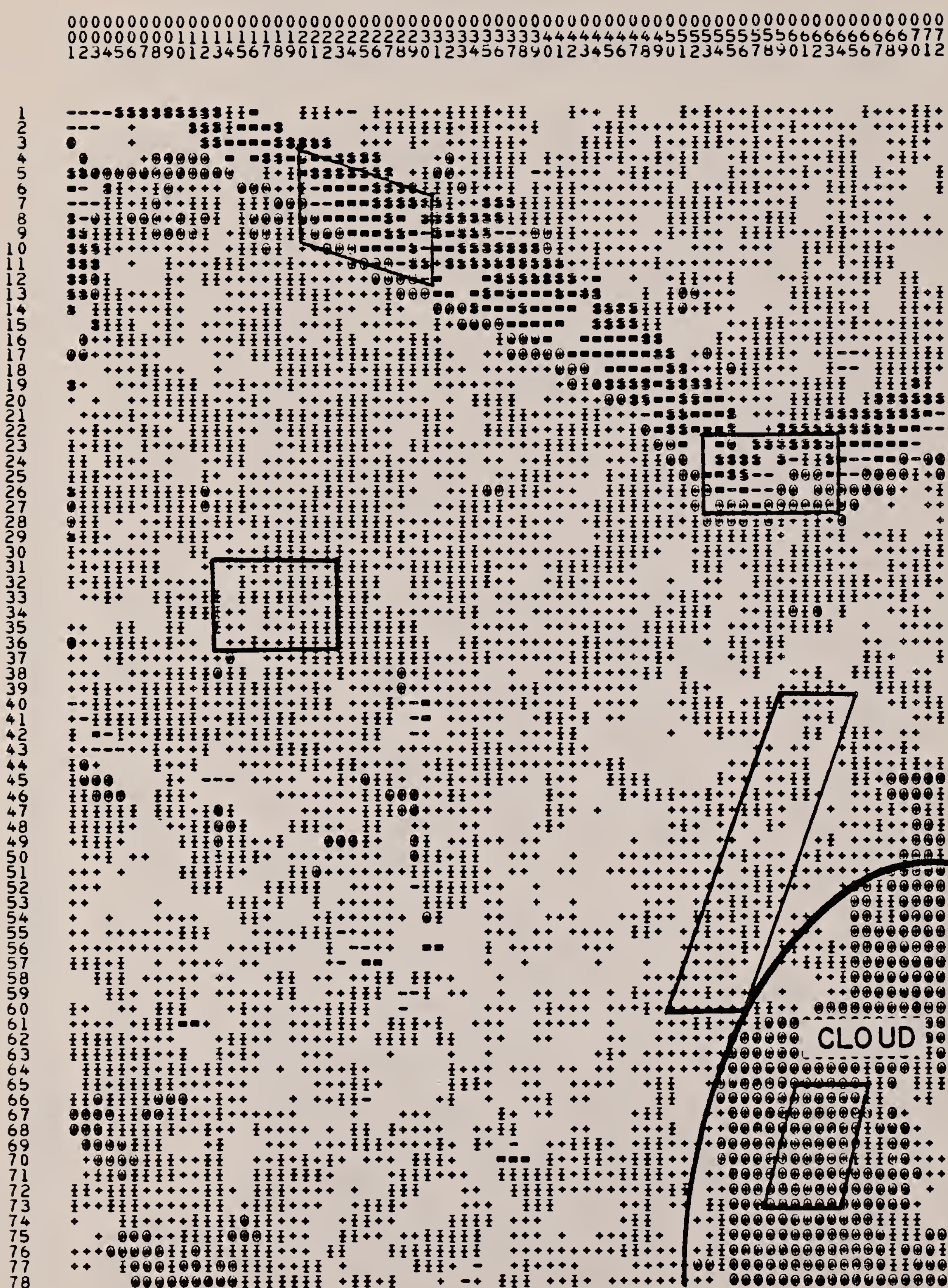


FIGURE A4.2.5-17

Graymap of Change Detection
June 1979 - June 1980 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$ NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	= NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	- NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED	NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+ POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡ POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@ POSITIVE - STRONG

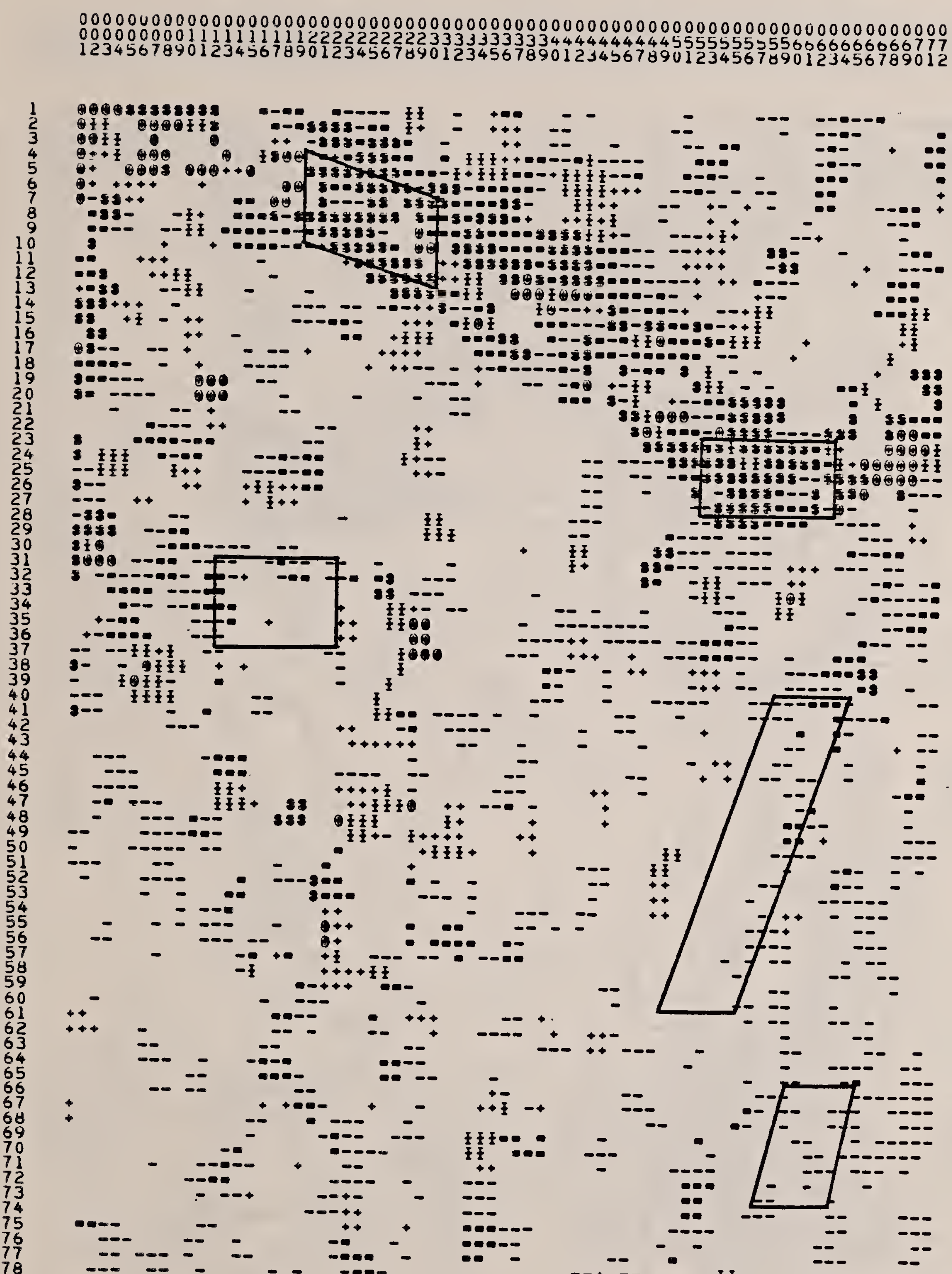


FIGURE A4.2.5-18

Graymap of Change Detection
August 1979 - August 1980 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	■	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

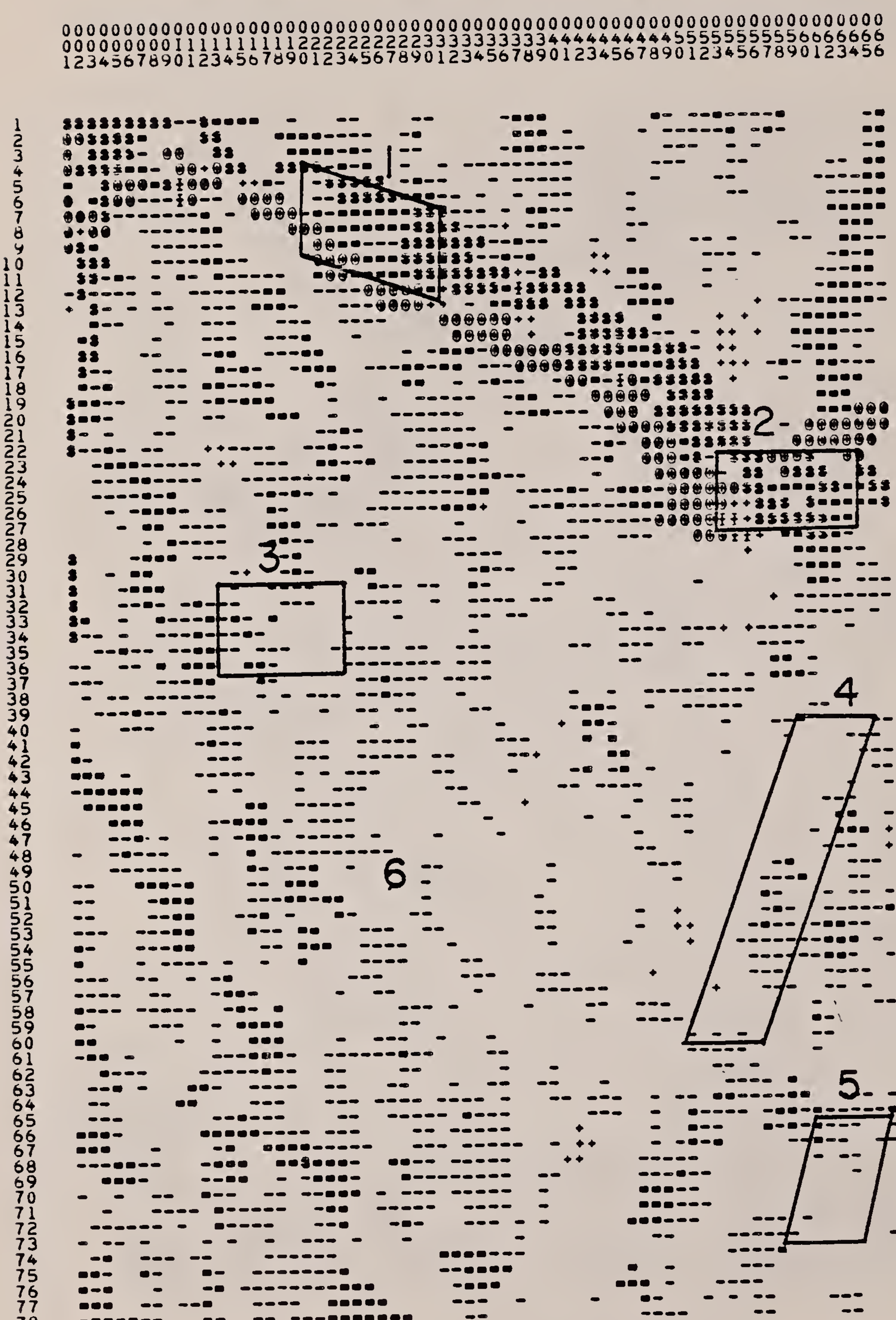


FIGURE A4.2.5-19

Graymap of Change Detection
June 1977 - August 1977 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	▬	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

FIGURE A4.2.5-20

Graymap of Change Detection
June 1979 - August 1979 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	■	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

FIGURE A4.2.5-21

Graymap of Change Detection
June 1980 - July 1980 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	■	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

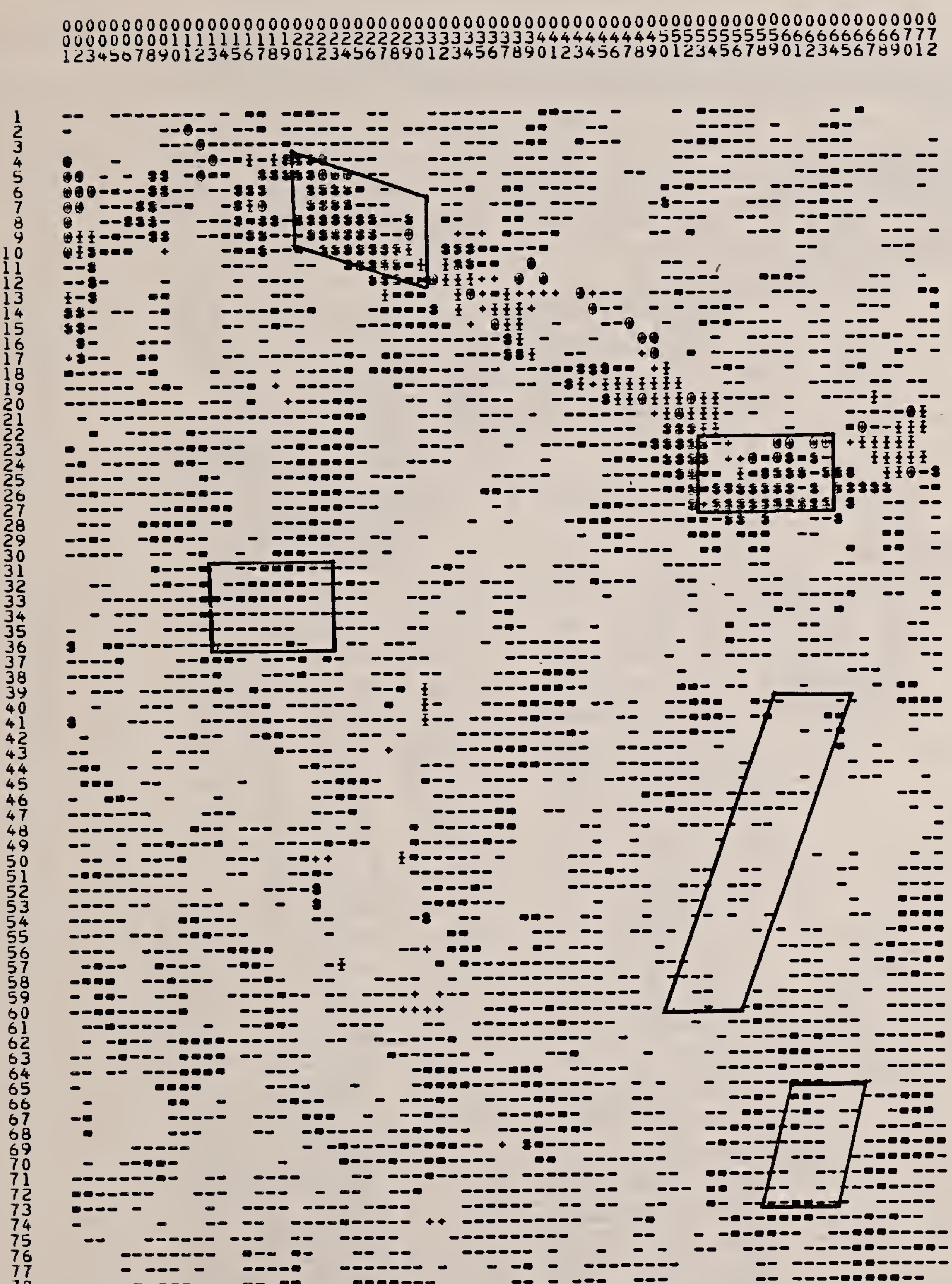


FIGURE A4.2.5-22

Graymap of Change Detection
June 1980 - August 1980 Image Dates

THE CHARACTER SET USED FOR DISPLAY IS

FROM	0.00	TO	79.50	DISPLAYED	$	NEGATIVE - STRONG
FROM	79.50	TO	89.50	DISPLAYED	=	NEGATIVE - MILD
FROM	89.50	TO	94.50	DISPLAYED	-	NEGATIVE
FROM	94.50	TO	105.50	DISPLAYED		NO CHANGE
FROM	105.50	TO	110.50	DISPLAYED	+	POSITIVE
FROM	110.50	TO	120.50	DISPLAYED	‡	POSITIVE - MILD
FROM	120.50	TO	256.00	DISPLAYED	@	POSITIVE - STRONG

FIGURE A4.2.5-23

Graymap of Change Detection
June 1980 - September 1980 Image Dates

CHAPTER 5.0

Hydrology and Water Quality

CHAPTER 5.0 (Continued)

APPENDIX A5.2.1-4

BOX-JENKINS UNIVARIATE TIME-SERIES ANALYSIS PROCEDURES

The purpose of the Box-Jenkins (B-J) analysis is to analyze a time-series (a set of data points with equal time intervals) which has a fluctuating historical pattern. B-J is best utilized when at least two cycles have past. In this study a cycle is a water year. B-J analysis requires no missing data points. In the case of missing data points linear interpolations were made for those indicator variables with relatively few missing data points. From the B-J analysis it can be established if a significant trend is taking place, and provides the information for the development of a model for forecasting and a forecast through a future time cycle. The B-J analysis is characterized by three basic steps: 1) Model Identification, 2) Model Estimation, and 3) Forecasting.

Model Identification: Before a series can be modeled using the B-J technique, it must be stationary. A non-stationary time-series has two characteristics: 1) the mean of the series has a dependence on time, 2) the series has a very slow or almost non-decaying auto-correlation function (ACF). To determine if a series is stationary a plot of the ACF lags are examined. If the series is stationary one of three types of models can be identified. If the ACF is: 1) a decaying exponential, 2) isolated spikes, or 3) a lumpy exponential (a combination of 1 and 2, then the model type is: 1) auto-regressive (AR), 2) moving average (MA) or 3) mixed AR-MA respectively. Suppose the series is determined to be non-stationary; stationary is achieved by differencing the series up to a maximum of five periods. However, differencing to a maximum of two periods is recommended.

The next step of the model identification is to examine the partial auto-correlation (PACF) lag plots and see if there are any significant spikes and at which lags they occur. This will determine the number of products and the order of these products for the appropriate model.

Model Estimation: The number of AR, MA or AR-MA products is specified. A trend may also be specified. A model summary is then analyzed to determine if the parameters associated with each product specified and the trends are significant. The coefficient of determination for the model of the series may also be examined. A low coefficient of determination does not necessarily mean a poor model. To see if the model's coefficient of determination can be improved non significant products may be removed from the model. This will not, however, improve the models coefficient of determination in all cases. The next step is to determine if the mean of the residuals is statistically zero and if there are no significant spikes at lags in the ACF of the residuals. If the mean of the residuals is not zero and (or) significant spikes exist all of the noise in the series has not been accounted for by the model. Another model may have to

be specified to remedy this situation. The next step is to check the correlation matrix and determine if the model is overspecified. The correlation matrix gives the correlation between the parameters in the model summary. To determine model over specification, all the elements of the matrix except those on the diagonal should be less than 0.5000. All elements on the diagonal will be 1; that is, a parameter correlates with self perfectly. If the model is over specified the solution to this problem may be to: 1) drop out any insignificant products if any, or 2) respecify another model. Each of these steps after the model summary are referred to as diagonstic checks.

The most general form of the Box-Jenkins model has the "autoregressive-integrated moving average" form (ARIMA)

$$(1-\phi B-\phi_2 B^2-\phi_3 B^3-\ldots-\phi_p B^p)\ (1-B)^d z_t = (1-\Theta B-\Theta_2 B^2-\Theta_3 B^3-\ldots-\Theta_q B^q) a_t$$

where z_t = z_t if d, the number differencing terms, >0, and $z_t = z_t - \mu$ if $d = 0$, with μ representing the series mean. z_t is the value of series z at time t. The ϕ_m, m = 1, 2, 3, ..., p are autoregressive parameters and appear in the autoregressive factor in the model, while the Θ_m, m = 1, 2, 3, ..., q are moving average parameters and appear in the moving average factor in the model. This model is generally shortened to the form ARIMA (p, d, q), where p and q refer to the order of the autoregressive and moving average processes, respectively, and the d refers to the order of differencing necessary to achieve stationarity. Order refers to the highest time lag for backshift operator B used with p and q and to the highest time lag for differencing with d.

Forecasting: A fixed lead time forecast is performed to produce two more diagnostic checks: 1) A backward origin of the original series is specified and 2) Lead time of one is choosen. The backward origin will compare forecasted values with original values in the series and establish if there is an agreement between them. By choosing a lead time of one each point in time that was specified by the backward origin will have associated with it accumlative sum of forecasting errors. If these errors diverge positively or negatively the forecast will be biased. One solution to this problem may be to respecify the model.

Finally, the last step is to perform a variable lead time forecast. A backward orgin is selected and a lead time greater then the backward origin is selected to produce a forecast. In conclusion, there is no clear cut method to modeling a series with the B-J technique. One must keep in mind the information needed and make the best decisions that will produce a model that will give the desired information. For hypothesis testing an $\alpha = 0.05$ significance level was used.

TABLE A5.2.1-1 - BOX JENKINS TIME SERIES ANALYSIS
USGS Station Number 6007

Variable: FLOW cfs

I. BASIC STATISTICS FOR SERIES
   A. Number of Observations = 75
   B. Mean = 13.6572
   C. Variance = 297.701
   D. Min = 1.100
   E. Max = 132.500

II. SERIES ANALYSIS
   A. ACF Analysis: Decaying Exponential
   B. PACF Analysis: Significant Spike at Lag 1

III. MODEL ANALYSIS
   A. Product Number and Parameter Order

Product Number	Parameter Order
MA 1	1

   B. Significant Trend? No
   C. The Model? $Z_t - 13.6572 = (1 + 0.34835B)a_t$
   D. Coefficient of Determination? 0.1068

IV. DIAGNOSTIC ANALYSIS
   A. Is the mean of residuals = 0 at 95% confidence interval? Yes
   B. Is computed Chi-square χ_c^2 less than table Chi-square χ_t^2 for given degrees of freedom?
      1. χ_c^2 = 7.34258   2. χ_t^2 = 6.571   3. df = 14
      $\chi_c^2 > {}_t^2$; No
   C. Is there any noise that cannot be accounted for? No
   D. Is the model overspecified? Not applicable with one term

V. FORECAST ANALYSIS
   A. Diagnostic Analysis Continued
      1. For a backward origin of ______ months the number of forecast agreements is ______.
      2. Is the forecast biased? ________. If yes, is the sum of errors diverging in a positive or negative direction? ________
      3. The forecast for this indicator variable in the next 12 months is ________

VI. Discussion of results, if any: No trend therefore forecasting not performed.

TABLE A5.2.1-2 - BOX JENKINS TIME SERIES ANALYSIS
USGS Station Number 6061

Variable: FLOW cfs

I. BASIC STATISTICS FOR SERIES
   A. Number of Observations = 78
   B. Mean = 20.1690
   C. Variance = 355.660
   D. Min = 3.200
   E. Max = 115.330

II. SERIES ANALYSIS
   A. ACF Analysis: Decaying Exponential - Seasonality
   B. PACF Analysis: Significant Spikes at Lags 1 and 11

III. MODEL ANALYSIS
   A. Product Number and Parameter Order

Product Number	Parameter Order
AR 1	1

   B. Significant Trend? No
   C. The Model? $(1 - 0.3314B)(Z_t - 20.1690) = a_t$
   D. Coefficient of Determination? 0.0983

IV. DIAGNOSTIC ANALYSIS
   A. Is the mean of residuals = 0 at 95% confidence interval? Yes
   B. Is computed Chi-square χ_c^2 less than table Chi-square χ_t^2 for given degrees of freedom?
      1. χ_c^2 = 13.2845   2. χ_t^2 = 5.892   3. df = 13
      $\chi_c^2 > {}_t^2$; No
   C. Is there any noise that cannot be accounted for? No
   D. Is the model overspecified? Not applicable with one term

V. FORECAST ANALYSIS
   A. Diagnostic Analysis Continued
      1. For a backward origin of ______ months the number of forecast agreements is ______.
      2. Is the forecast biased? ______. If yes, is the sum of errors diverging in a positive or negative direction? ______
      3. The forecast for this indicator variable in the next 12 months is ______

VI. Discussion of results, if any: No trend therefore forecasting not performed.

TABLE A5.2.2-1

SHORT TERM TIME SERIES ANALYSIS FOR FLOW OF SPRINGS AND SEEPS FOR WATER YEAR 1980

	WS01	WS02	WS03	WS04	* WS06	WS07	WS08	WS09	WS10
1.	1.7008/12	0.0583/12	2.0269/10	0.5036/12	0.8330/11	0.4470/5	0.3098/12	0.2118/12	0.6197/12
2.	0.2958	0.8112	0.2059	0.0170	0.0496	0.9196	0.6764	0.0274	0.0093
3.				-0.0006	-0.0015			-0.2522	-0.0006
4.				5.2598	11.8478			6.2833	5.3601
5.				0.4496	0.3634			0.4000	0.5079

	WS11	WS12	WS21	WS22	WS23	WS24	WS25	WS26	WS27
1.	0.5968/6	0.3565/4	0.5175/12	0.5445/12	2.0062/12	1.4340/12	1.1265/8	0.3546/12	0.2155/12
2.	0.4097	0.8850	0.0648	0.0033	0.0114	0.0308	0.5506	0.0886	0.0434
3.				0.0006	0.0044	0.0030			0.0005
4.				-4.1328	-30.2299	-20.3911			-3.3666
5.				0.5958	0.4885	0.3870			0.3483

	WS28	WS29	WS30	WS31	WS32	WS33	WS34	WS35	WS36
1.	1.3568/11	0.1389/10	3.3597/12	1.9006/12	0.2111/12	1.1006/12	0.6267/12	0.8645/12	1.9122/8
2.	0.9514	0.2262	0.2222	0.0302	0.1150	0.9671	0.0011	0.1124	0.6576
3.				-0.0016			-0.0005		
4.				13.7473			4.0405		
5.				0.3890			0.6740		

Units of flow are cfs.

NOTE: Entries in the table mean the following:
1. Mean/Number of paired observations
2. $\hat{\alpha}$ - to be compared with selected α. (α = 0.05)
3. Slope - slope is units per month
4. Intercept
5. r^2 value

* There is no WS05.

TABLE A5.2.2-2

LONG TERM TIME SERIES ANALYSIS FOR FLOW OF SPRINGS AND SEEPS

	WS01	WS02	WS03	WS04	WS06	WS07	WS08	WS09	WS10
1.	1.6894/31	0.0791/27	0.7939/28	0.4105/28	0.7160/33	0.5725/6	0.3977/17	0.2204/35	0.5923/35
2.	0.9022	0.7413	0.3952	0.4728	0.5882	0.0041	0.0514	0.2627	0.5230
3.									
4.									
5.									

	WS11	WS12	WS21	WS22	WS23	WS24	WS25	WS26	WS27
1.	0.5872/7	0.1872/5	0.5407/16	0.5398/16	1.9380/16	1.4987/16	1.0541/11	0.3444/16	0.2087/16
2.	0.0994	0.2560	0.7883	0.0103	0.0002	0.5598	0.9833	0.2391	0.0882
3.				0.0034	0.0039				
4.				-1.9556	-26.5967				
5.				0.3854	0.6302				

	WS28	WS29	WS30	WS31	WS32	WS33	WS34	WS35
1.	1.3873/15	0.1365/14	3.3307/15	1.8634/15	0.2111/15	1.0931/15	0.6307/15	0.8875/16
2.	0.3840	0.5888	0.2214	0.8313	0.1363	0.7079	0.0001	0.6429
3.							-0.0005	
4.							3.9757	
5.							0.7318	

NOTE: Entries in the table mean the following:

1. Mean/Number of paired observations
2. $\hat{\alpha}$ - to be compared with selected α. ($\alpha = 0.05$)
3. Slope - slope is units per month
4. Intercept
5. r^2 value

Units of flow are cfs.

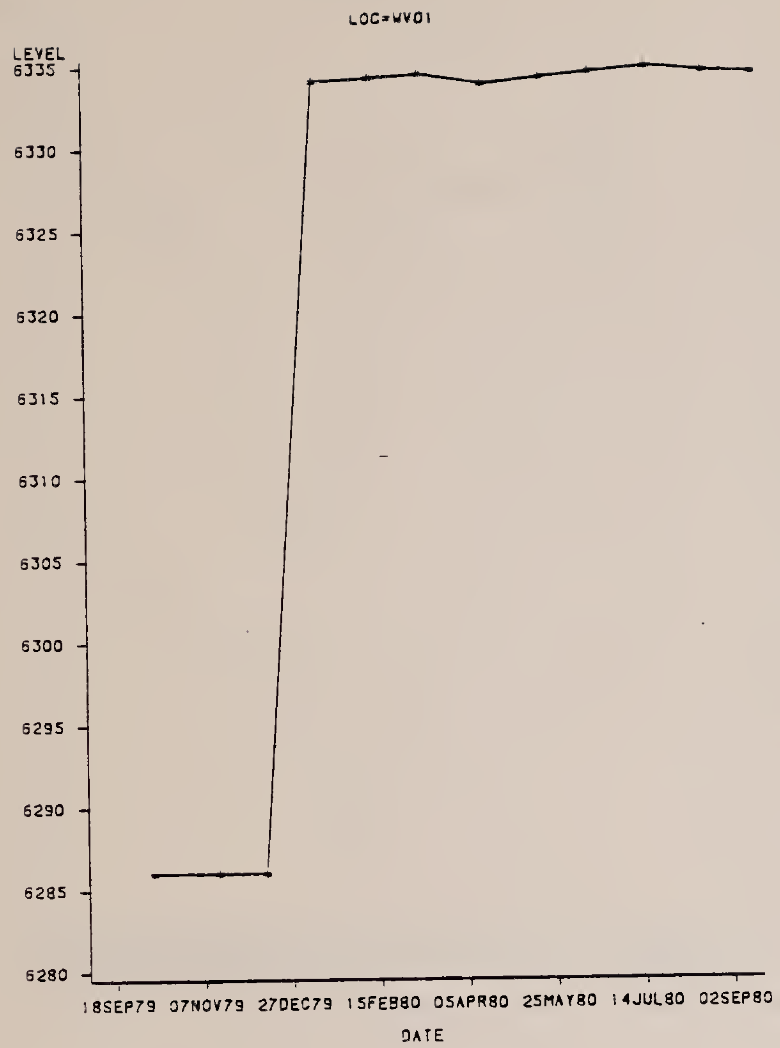
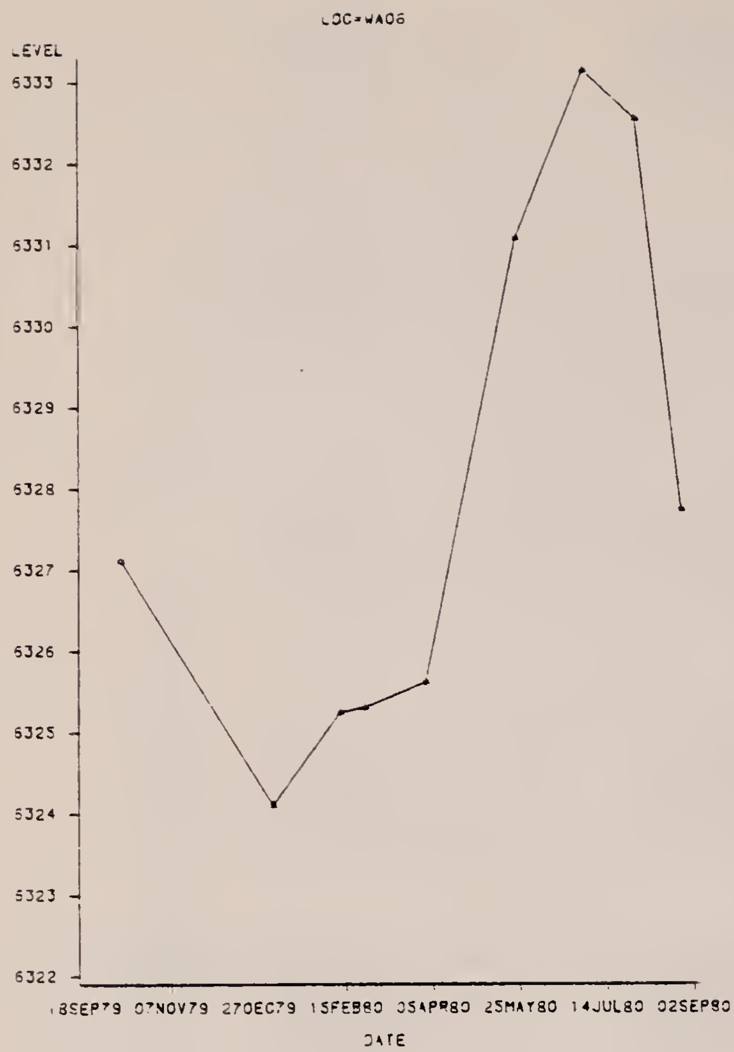


FIGURE A5.2.5-1 (Continued)
C-b Tract Lower Aquifer Well Levels



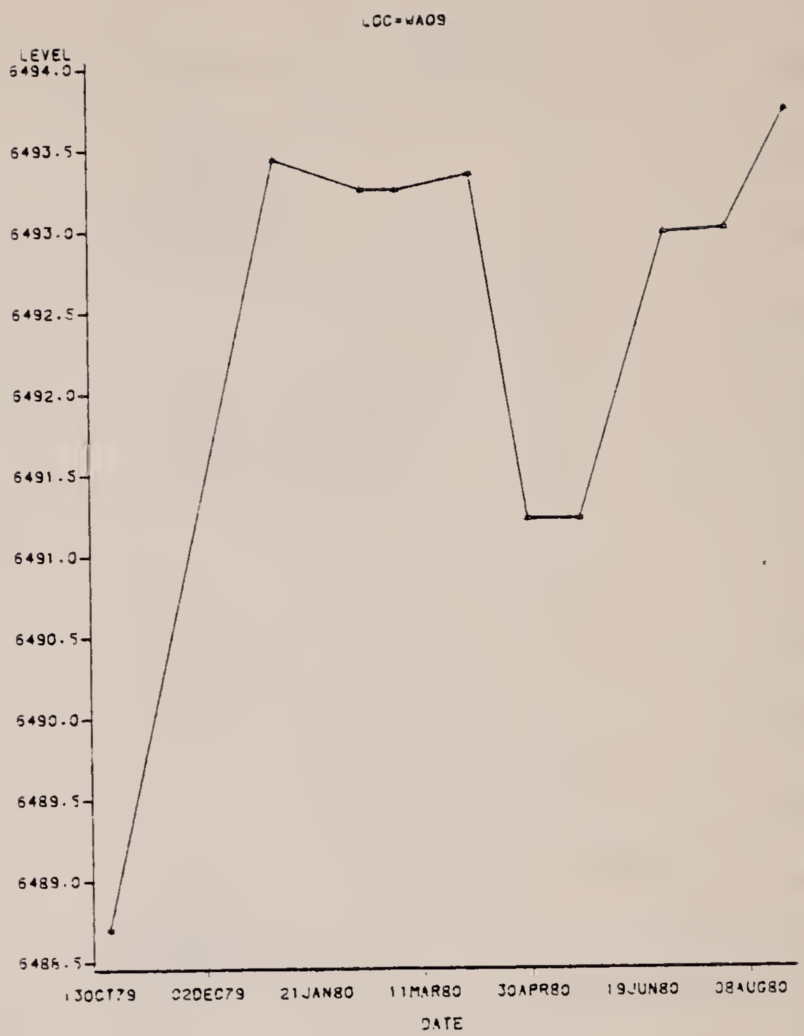


FIGURE A5.2.5-1 (Continued)
C-b Tract Lower Aquifer Well Levels

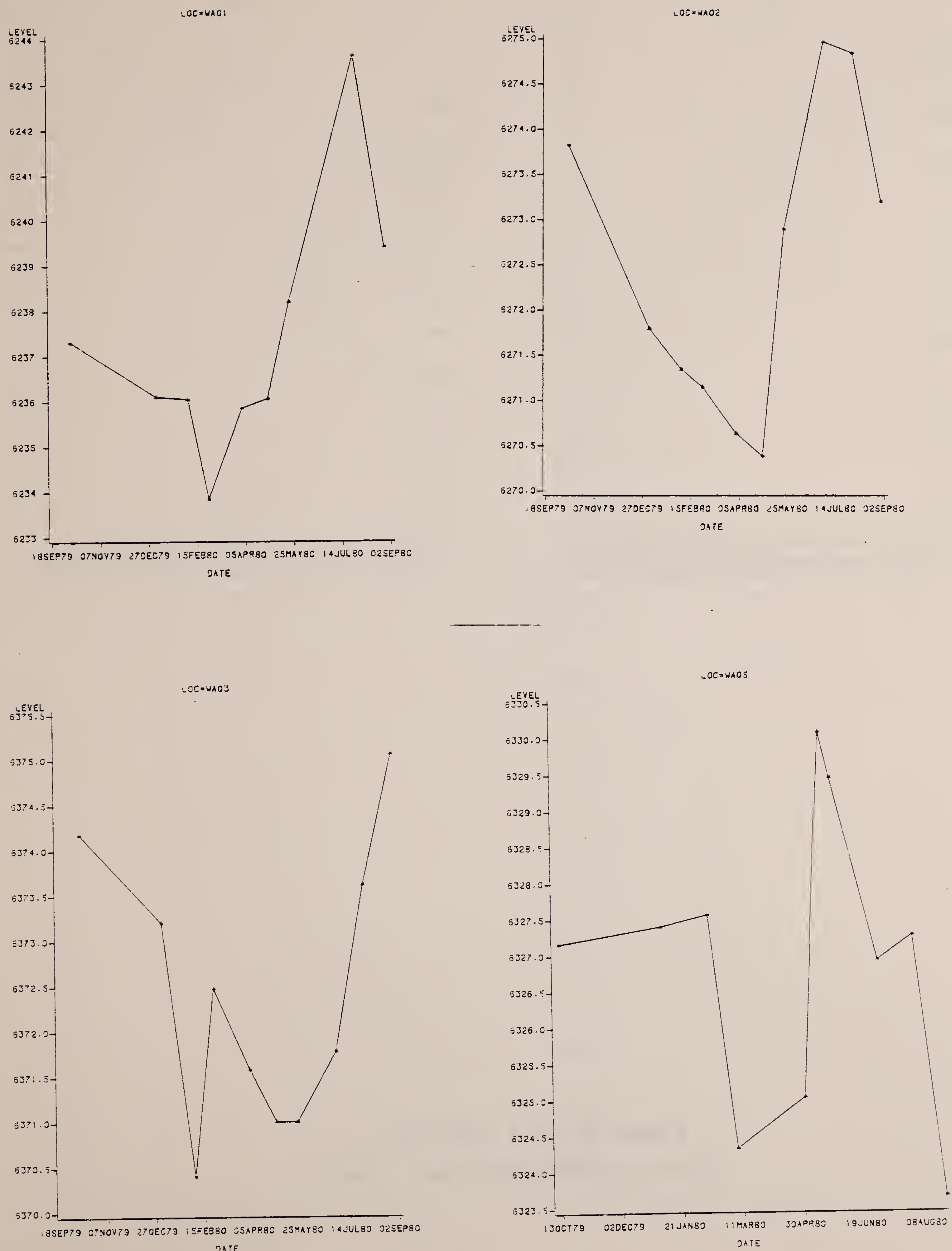


FIGURE A5.2.5-1 (Continued)
C-b Tract Lower Aquifer Well Levels

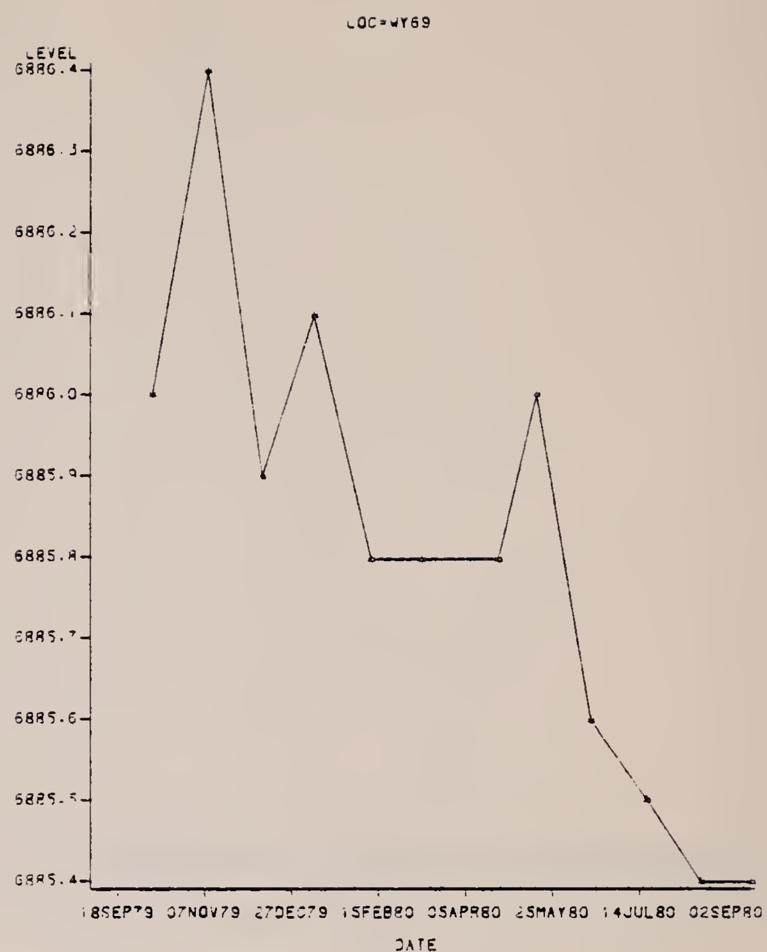


FIGURE A5.2.5-1 (Continued)
C-b Tract Lower Aquifer Well Levels

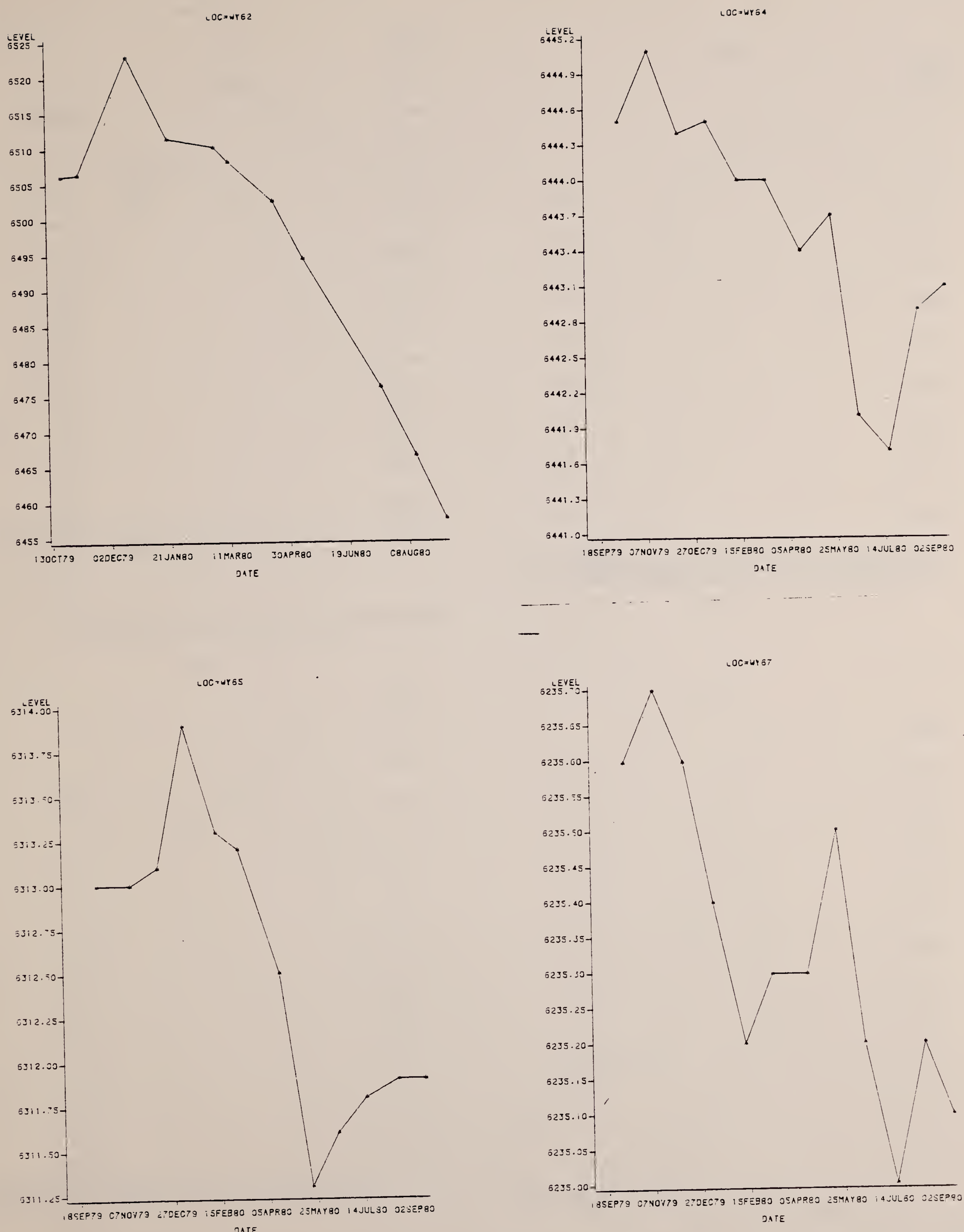


FIGURE A5.2.5-1 (Continued)
C-b Tract Lower Aquifer Well Levels

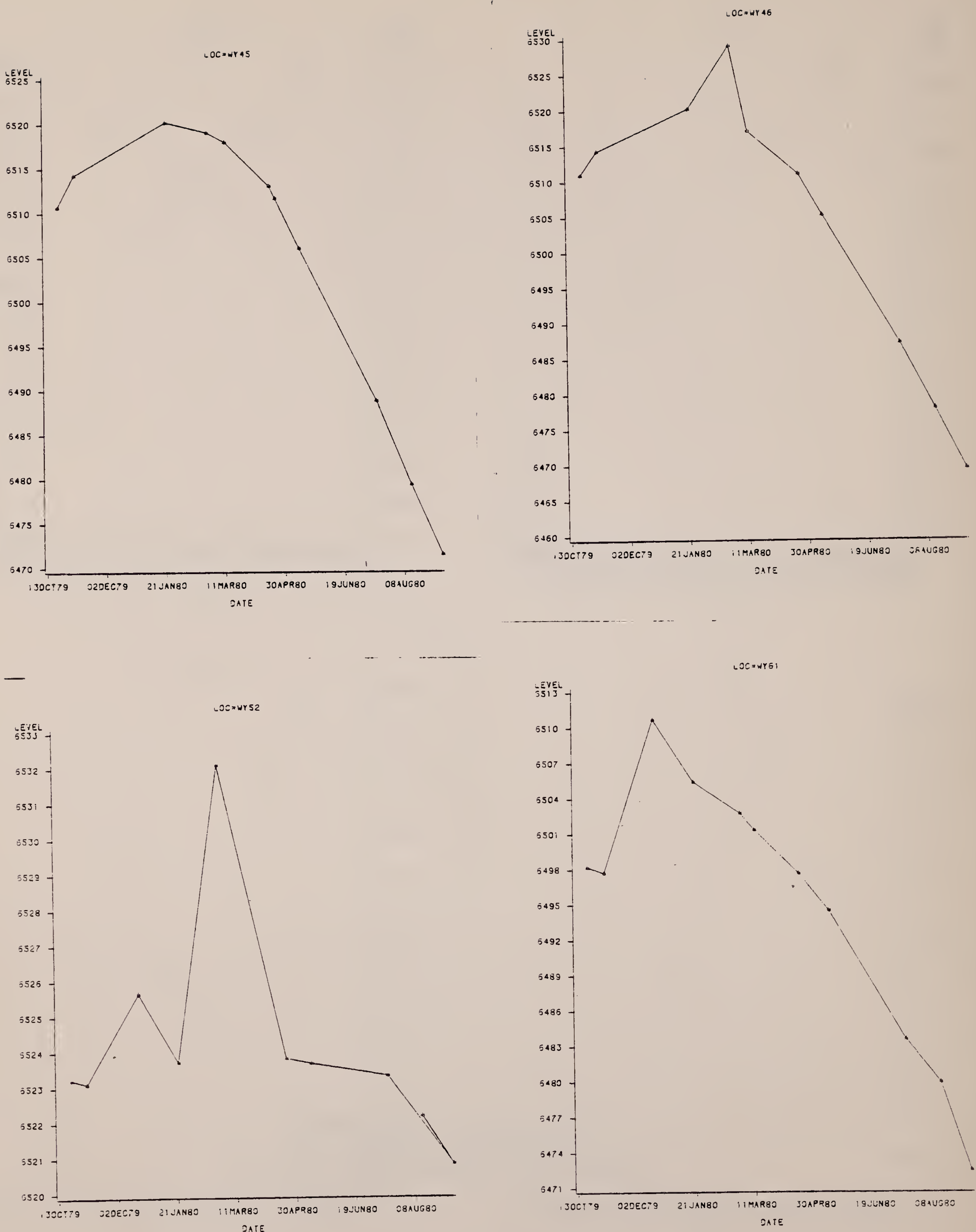


FIGURE A5.2.5-1 (Continued)
C-b Tract Lower Aquifer Well Levels

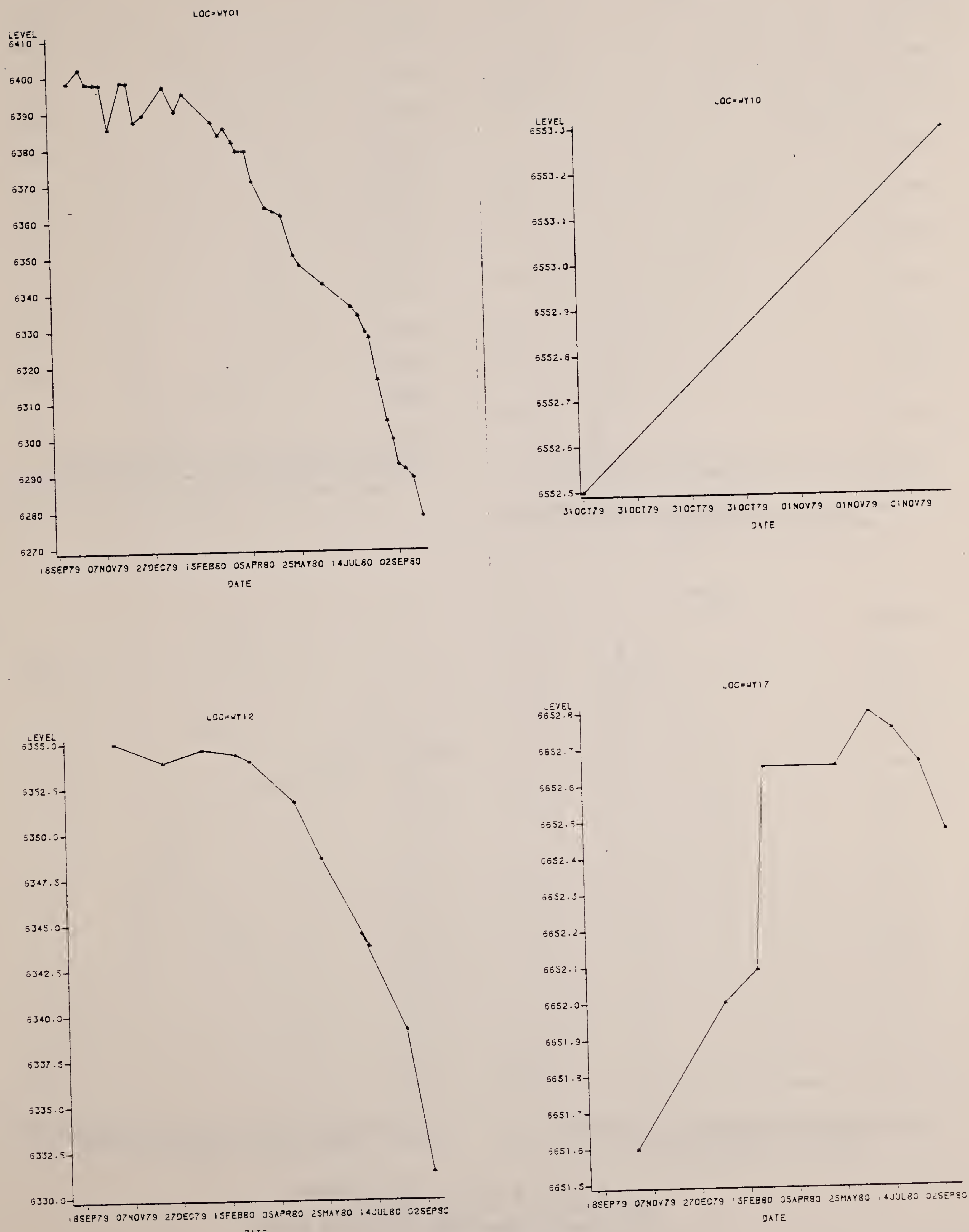
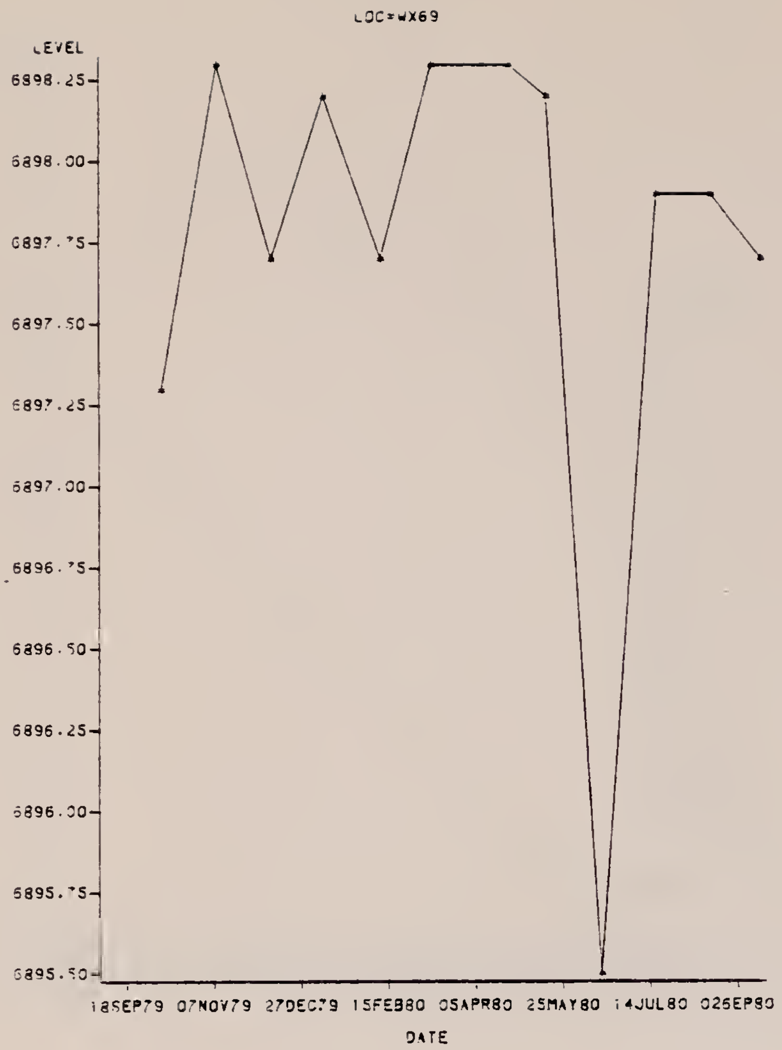
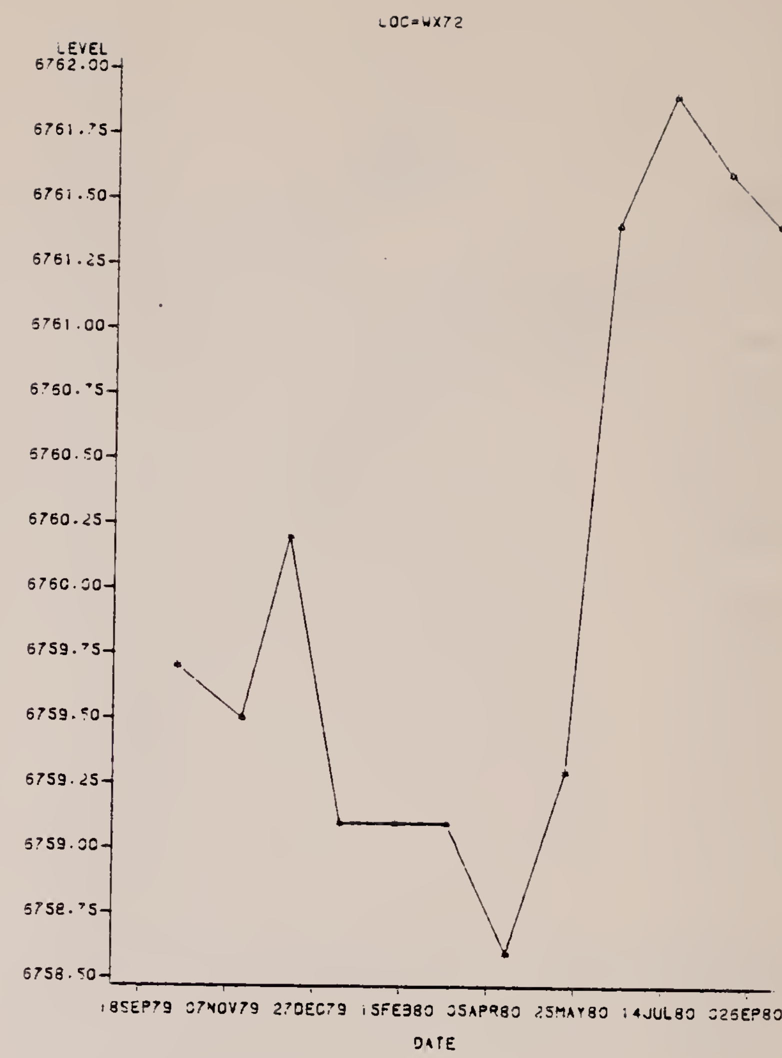
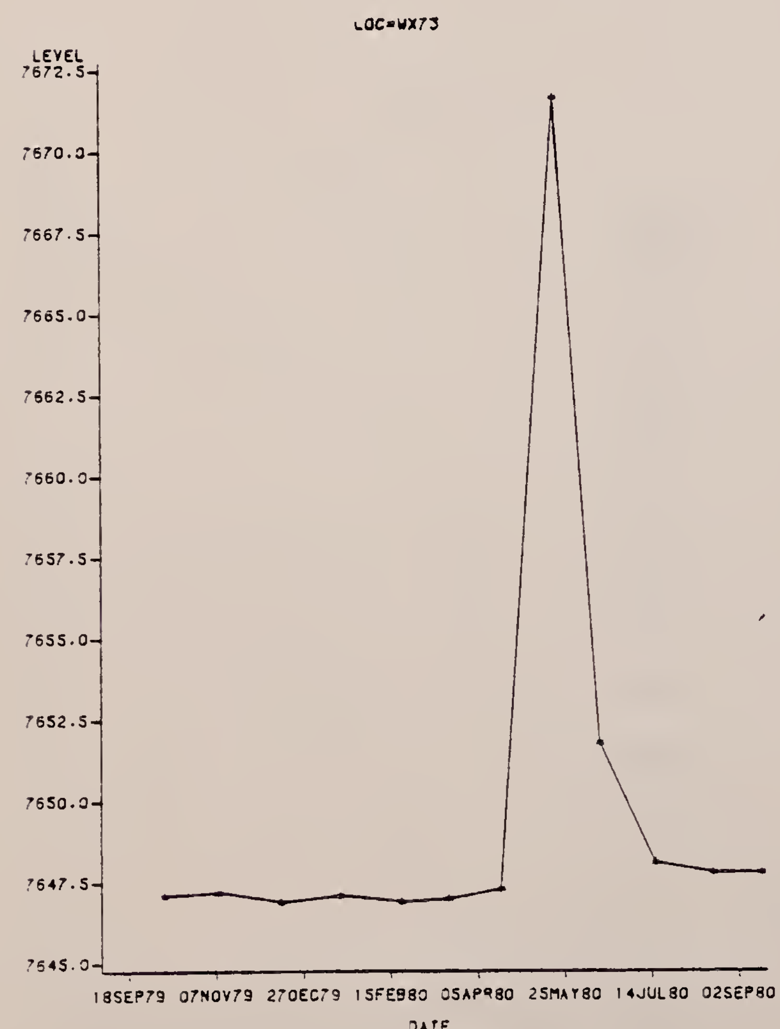


FIGURE A5.2.5-1

C-b Tract Lower Aquifer Well Levels







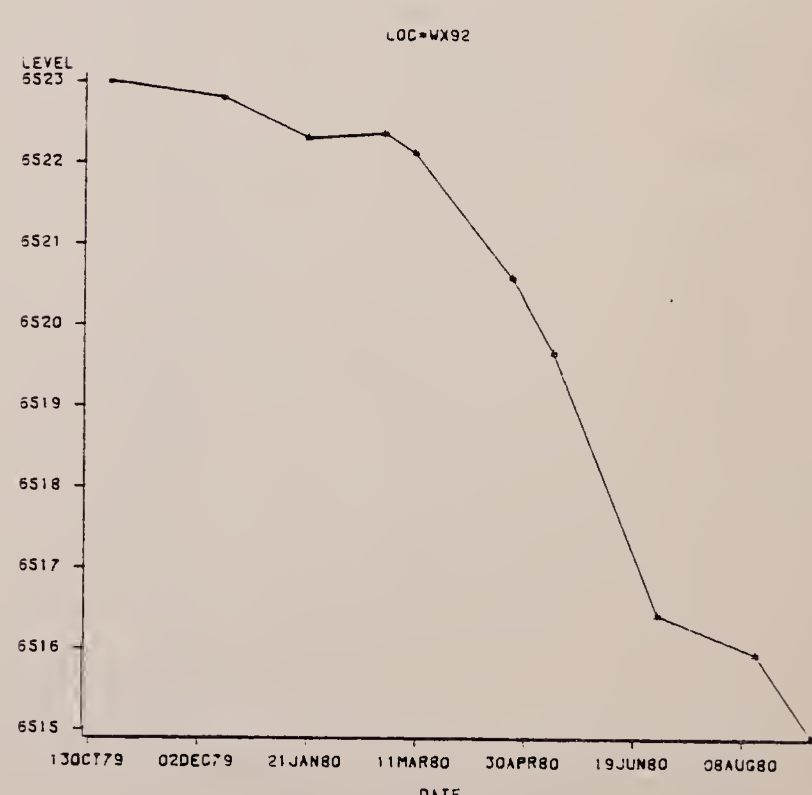
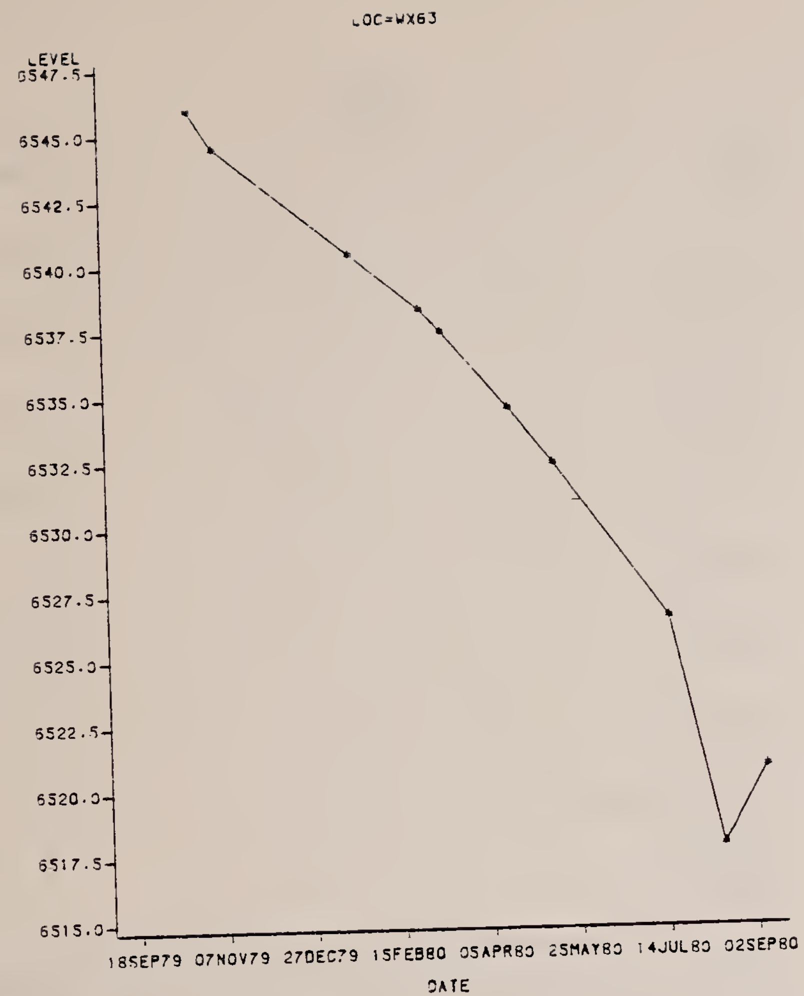
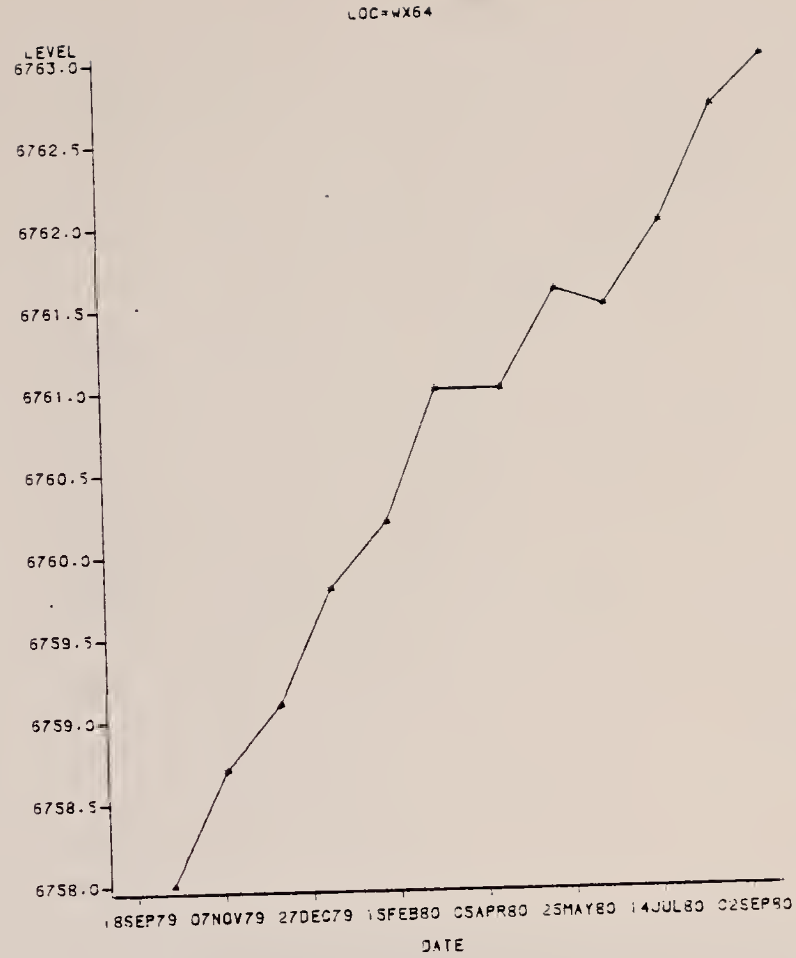
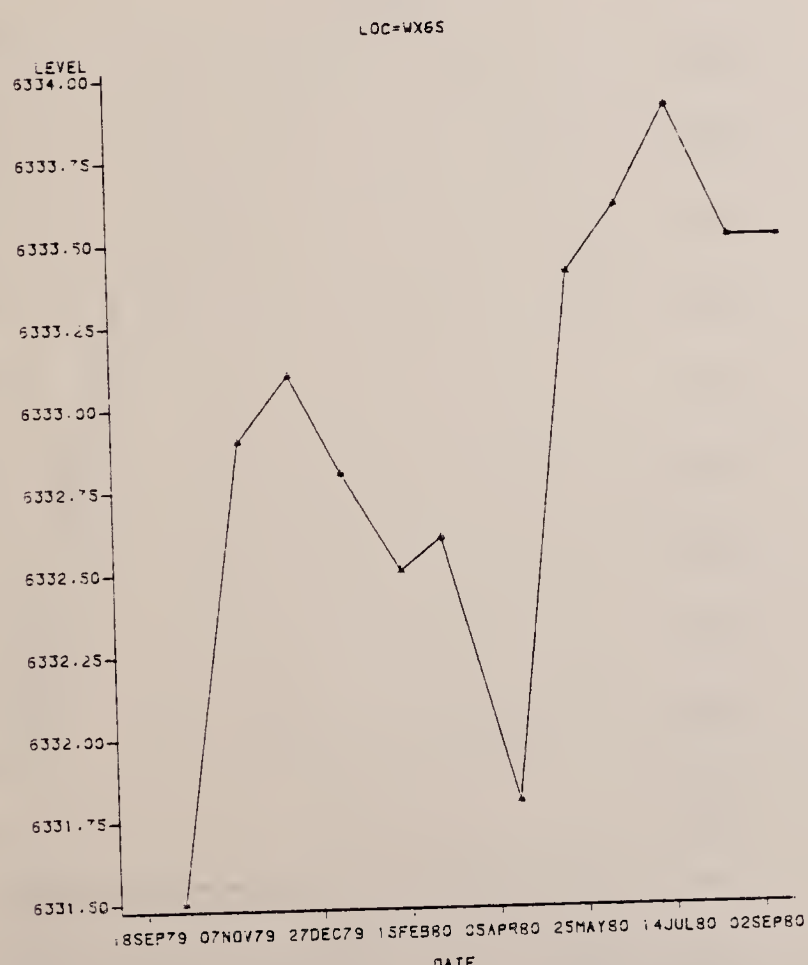


FIGURE A5.2.4-1 (Continued)

C-b Tract Upper Aquifer Well Levels







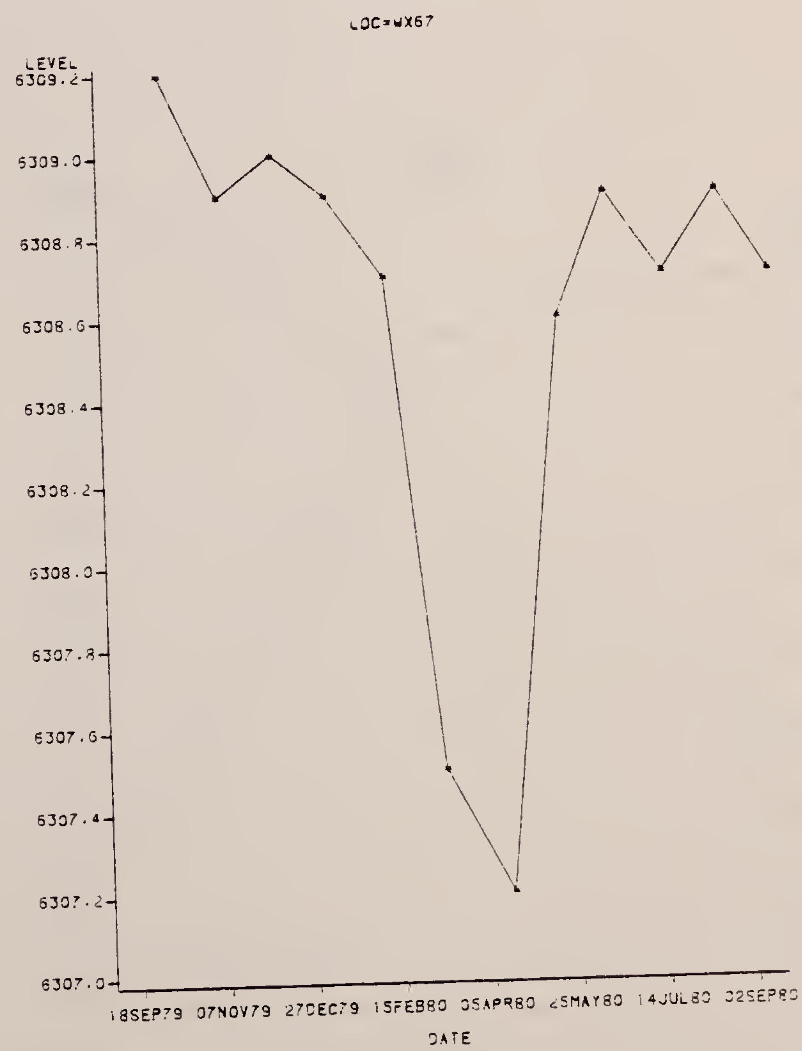


FIGURE A5.2.4-1 (Continued)

C-b Tract Upper Aquifer Well Levels

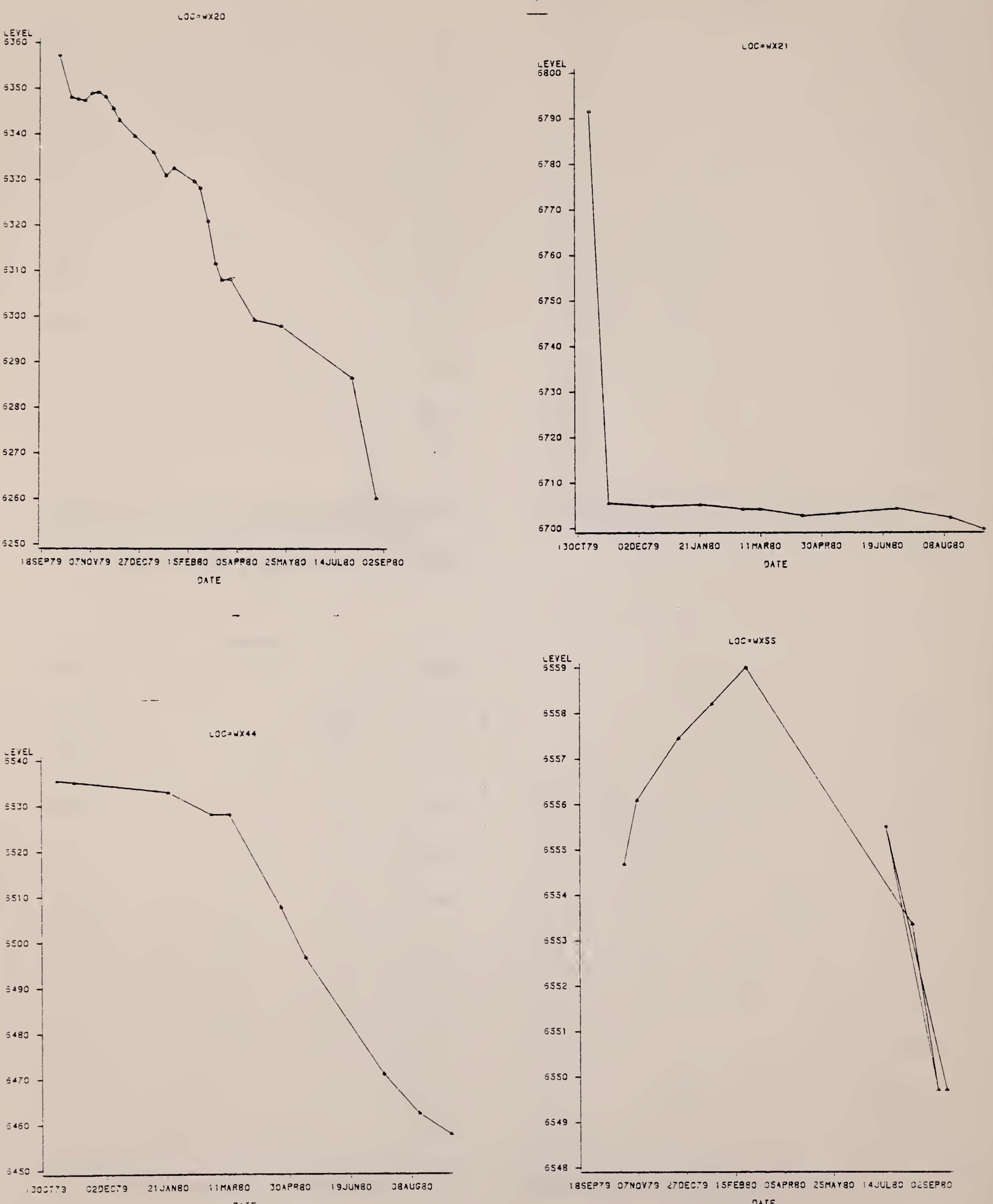


FIGURE A5.2.4-1 (Continued)

C-b Tract Upper Aquifer Well Levels

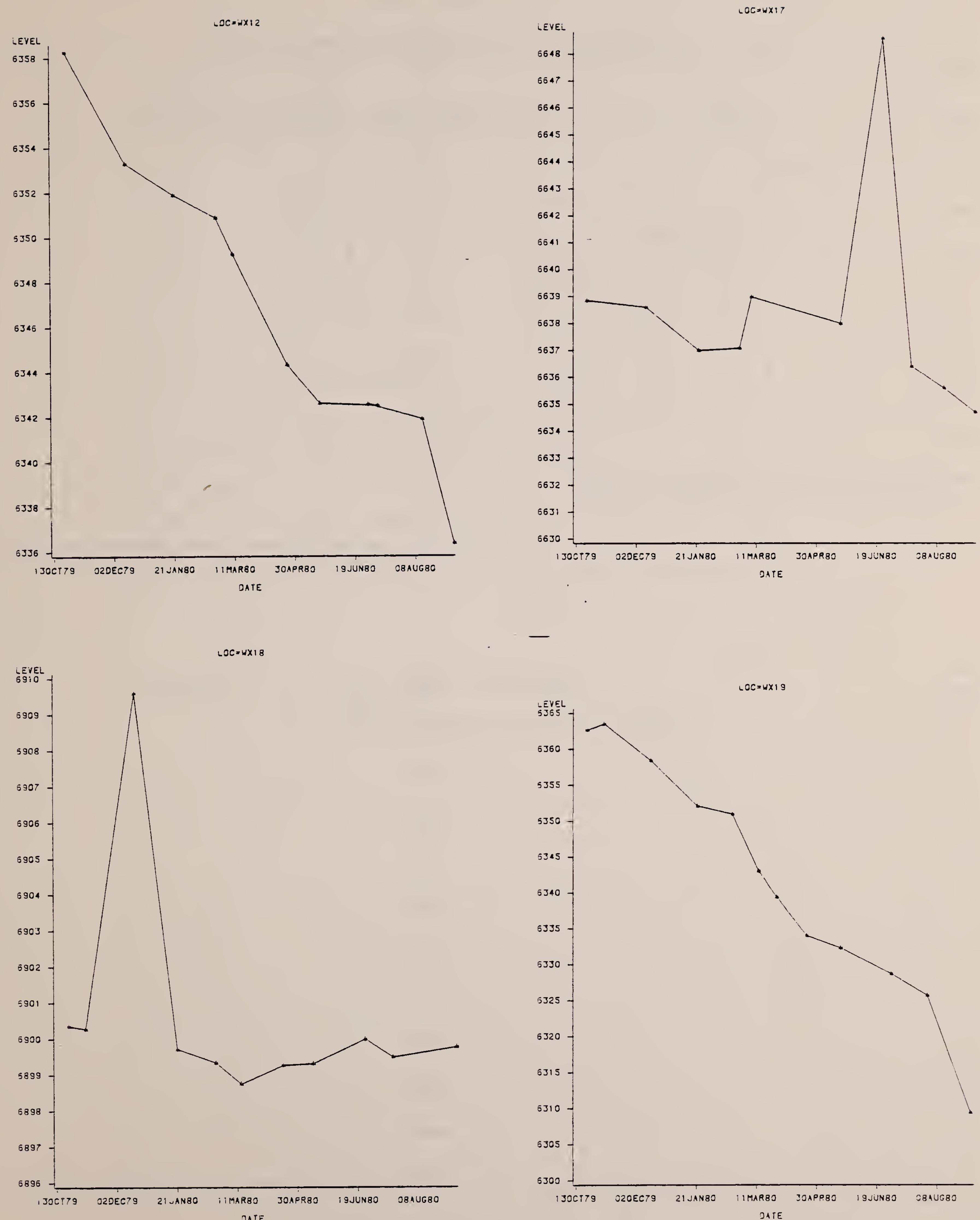


FIGURE A5.2.4-1 (Continued)

C-b Tract Upper Aquifer Well Levels

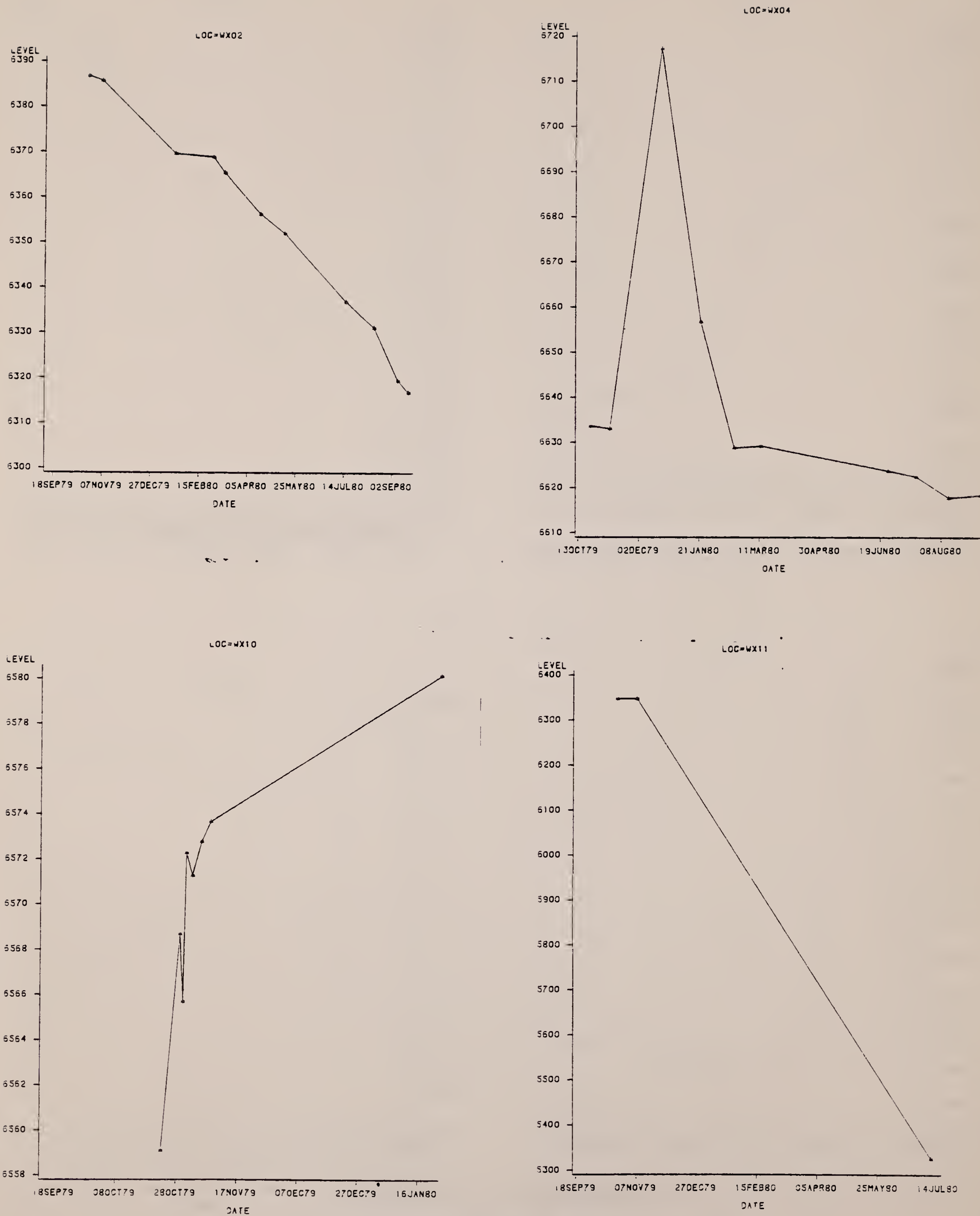


FIGURE A5.2.4-1

C-b Tract Upper Aquifer Well Levels

TABLE A5.2.7-1

Water Augmentation Correlation Studies of
Monthly Piceance Creek Flow and Precipitation

Year	Month	AB20	AB23	WR01	WU07	WU61	WU00
80	1	4.27	2.84	1.15	9.61	18.71	Data Not Available
80	2	3.61	3.53	1.61	10.06	21.45	
80	3	5.82	5.74	2.07	11.29	22.90	
80	4	1.98	2.24	-	29.83	37.57	
80	5	5.92	2.26	2.77	90.79	81.16	
80	6	0.13	0.15	-	16.29	15.79	
80	7	3.48	1.65	1.38	10.94	13.18	
80	8	2.49	1.57	1.81	18.30	27.09	
80	9	1.24	0.94	0.81	9.48	18.71	
80	10	1.53	1.17	1.20	-	-	
80	11	0.58	0.68	0.68	-	-	
80	12	0.86	0.94	0.33	-	-	

Note Unit: 1. Flow (cfs) - Averages
2. Precipitation (inches) - Totals

TABLE A5.3.1-1

Single Measurement Water Quality Data For Minor USGS Stations

	Station 6025	Station 6028	Station 6033	Station 6036	Station 6039	Station 6050	Station 6052
T. Alk	70	52	290	1040	300	37	68
Al	110	170	20	0	20	-	110
NH_3	0.33	0.12	0.00	0.00	0.00	0.10	0.07
As	1	2	3	10	2	1	3
Ba	200	200	200	100	90	-	100
B	200	160	80	930	100	150	80
Br	0.1	0.0	0.2	0.0	0.3	-	0.1
Cd	1	0	<1	0	<1	-	0
Ca	16	17	65	16	48	15	21
COD	290	200	17	130	15	-	140
Cl	3.1	2.8	21	9.2	15	3.4	5.5
Cr	0	10	0	0	0	-	0
Cu	2	3	3	4.	3	-	2
F	0.1	0.1	0.2	1.0	0.7	0.1	0.3
Fe	480	60	<10	70	<10	30	60
Pb	0	0.	0.0	5	3	-	0.0
Li	0	0	20	0	20	-	0
Mg	2.4	2.0	34	5.4	43	1.4	3.7
Mn	40	10	8	10	5	<1	10
Hg	0.0	0.1	0.0	0.0	0.0	-	0.0
Mb	1	1	<10	14	<10	-	2
phenols	10	8	0	3	2	13	5
K	9.6	7.0	2.6	4.2	1.5	6.1	4.8
Se	0	0	4	0	2	-	0
Si	3.0	8.1	18	20	16	3.1	8.7
Na	2.9	3.7	100	590	100	1.6	21
TDS	85	82	597	1530	578	70	136
Sr	130	200	1000	440	2200	-	180
SO_4	3.1	7.6	180	240	170	17	28
Zn	30	10	<3	40	<3.0	-	10
Gross α	58	<29	3.1	120	0.4	-	39
Gross β	11	9.6	7.2	<13	<4.4	-	8.5

TABLE A5.3.1-2

Specific Conductance & Temperature Data From Minor USGS Stations*

Station 4800	SP COND	TEMP
1.	14	14
2.	628	8.0
3.	684	13.5
4.	593	3.0

Station 6036	SP COND	TEMP
1.	2	2
2.	141	21.0
3.	179	26.0
4.	103	15.0

Station 6052	SP COND	TEMP
1.	6	6
2.	148	3.5
3.	176	19.5
4.	106	.0

Station 6025	SP COND	TEMP
1.	1	9
2.	100	0.5
3.		7.5
4.		.0

Station 6039	SP COND	TEMP
1.	6	6
2.	1410	12.5
3.	3690	23.5
4.	915	.0

Station 6200	SP COND	TEMP
1.	98	98
2.	1380	2.5
3.	1660	10.0
4.	558	.0

Station 6028	SP COND	TEMP
1.	15	14
2.	103	1
3.	157	12.5
4.	68	0.0

Station 6042	SP COND	TEMP
1.	32	32
2.	1790	17.5
3.	2190	31.5
4.	958	5.0

Station 6255	SP COND	TEMP
1.	175	175
2.	3350	6.5
3.	4440	.0
4.	517	31.5

Station 6033	SP COND	TEMP
1.	30	30
2.	782	10.0
3.	940	31.0
4.	611	.0

Station 6050	SP COND	TEMP
1.	1	1
2.	95	.0

NOTE:

1. Observations
2. Mean
3. Maximum
4. Minimum

* Date are based on a limited number of samples obtained during limited time periods throughout the year.

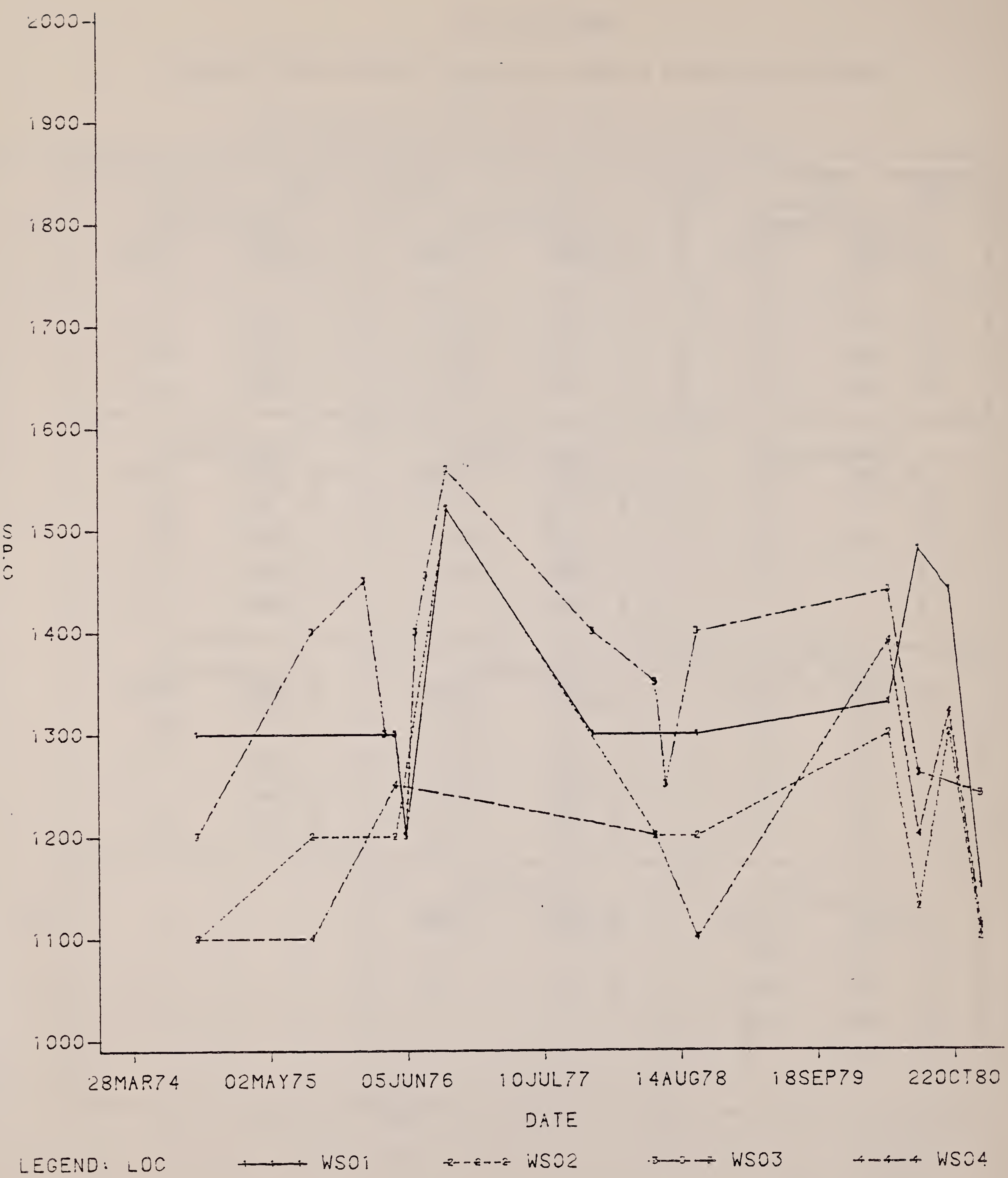


FIGURE A5.3.2-1

Springs Water Quality

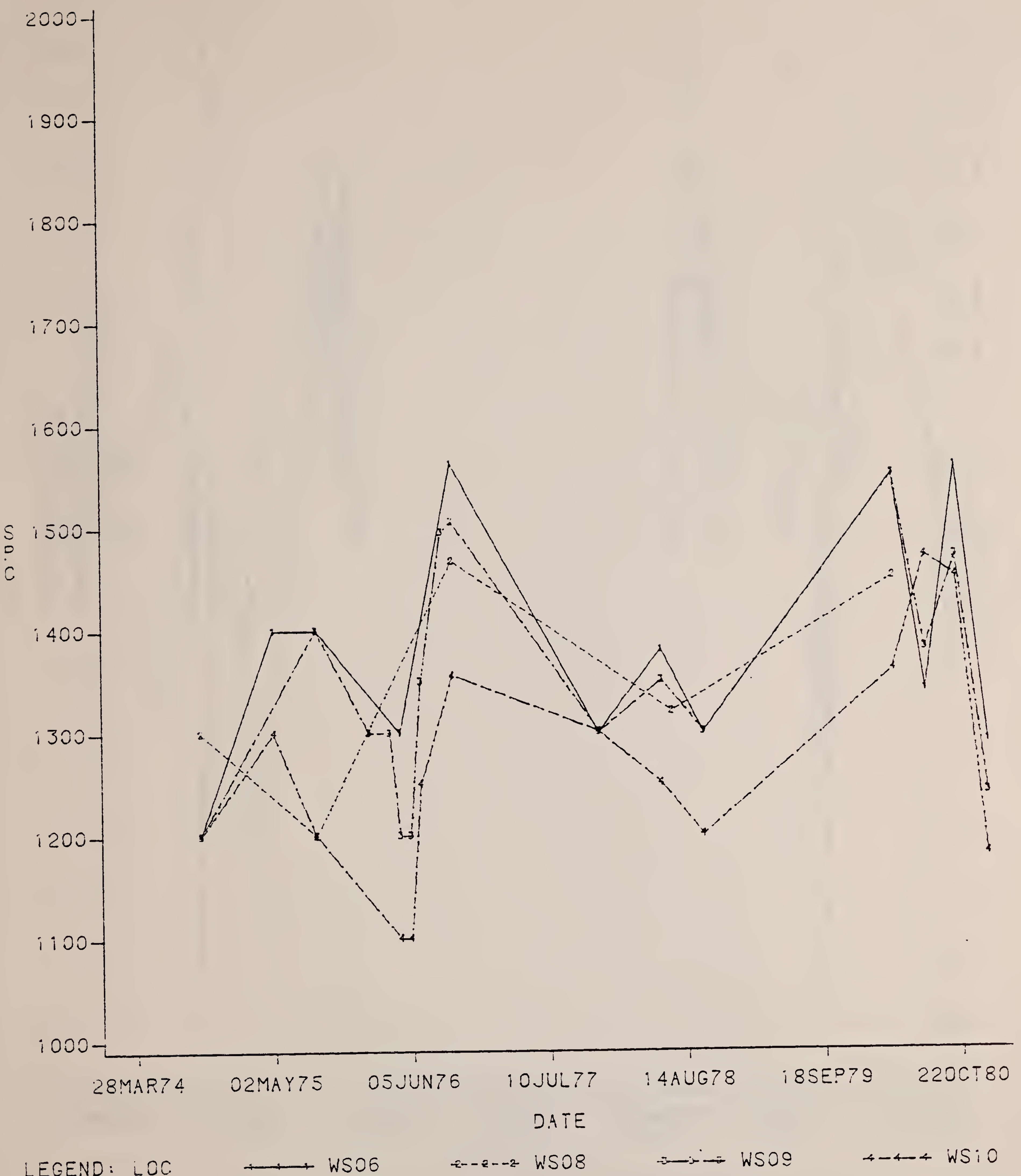
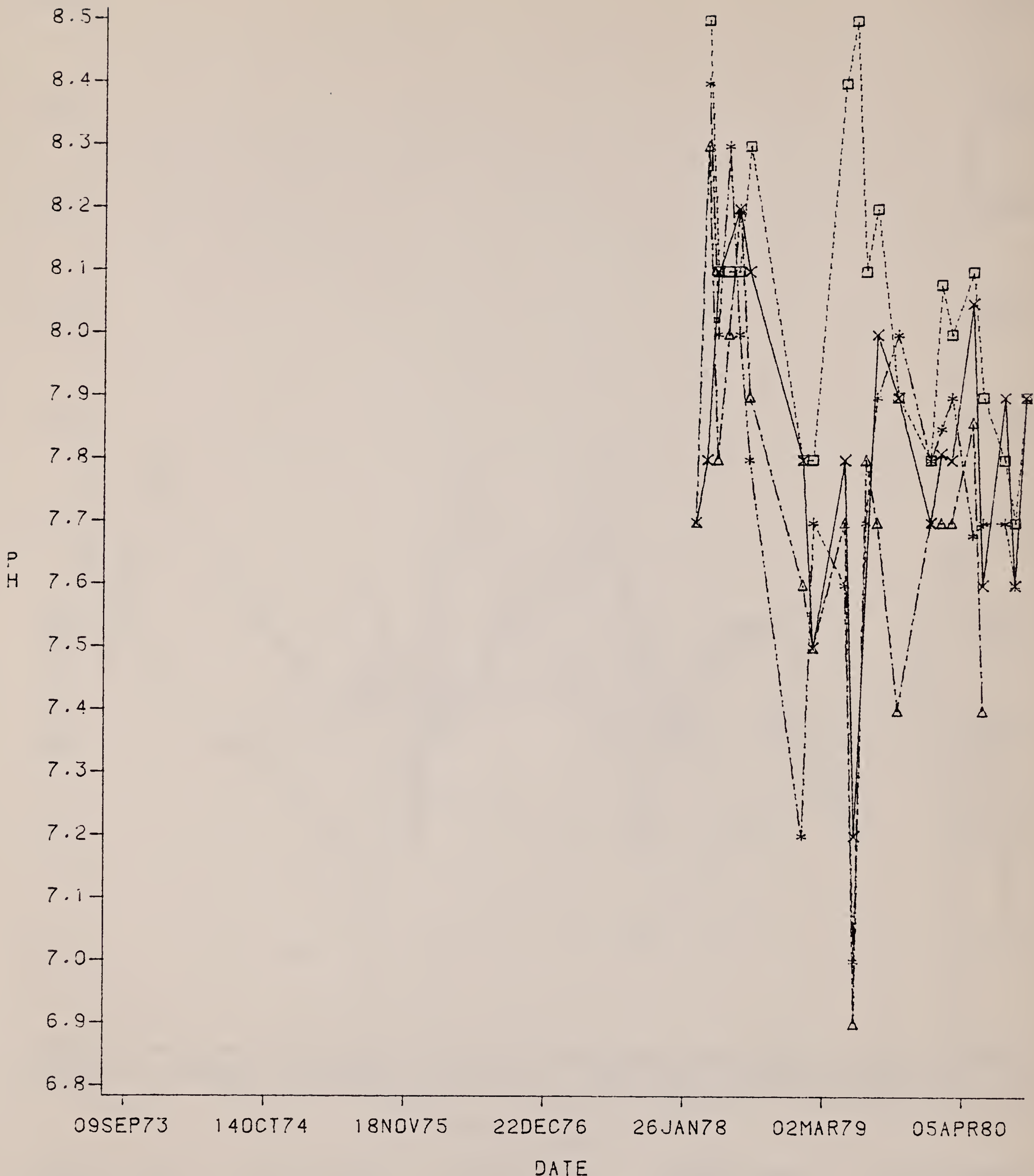


FIGURE A5.3.2-2
Springs Water Quality



WS01=X WS02=SQUARE WS03=TRIANGLE WS04=STAR

FIGURE A5.3.2-3

Springs Water Quality

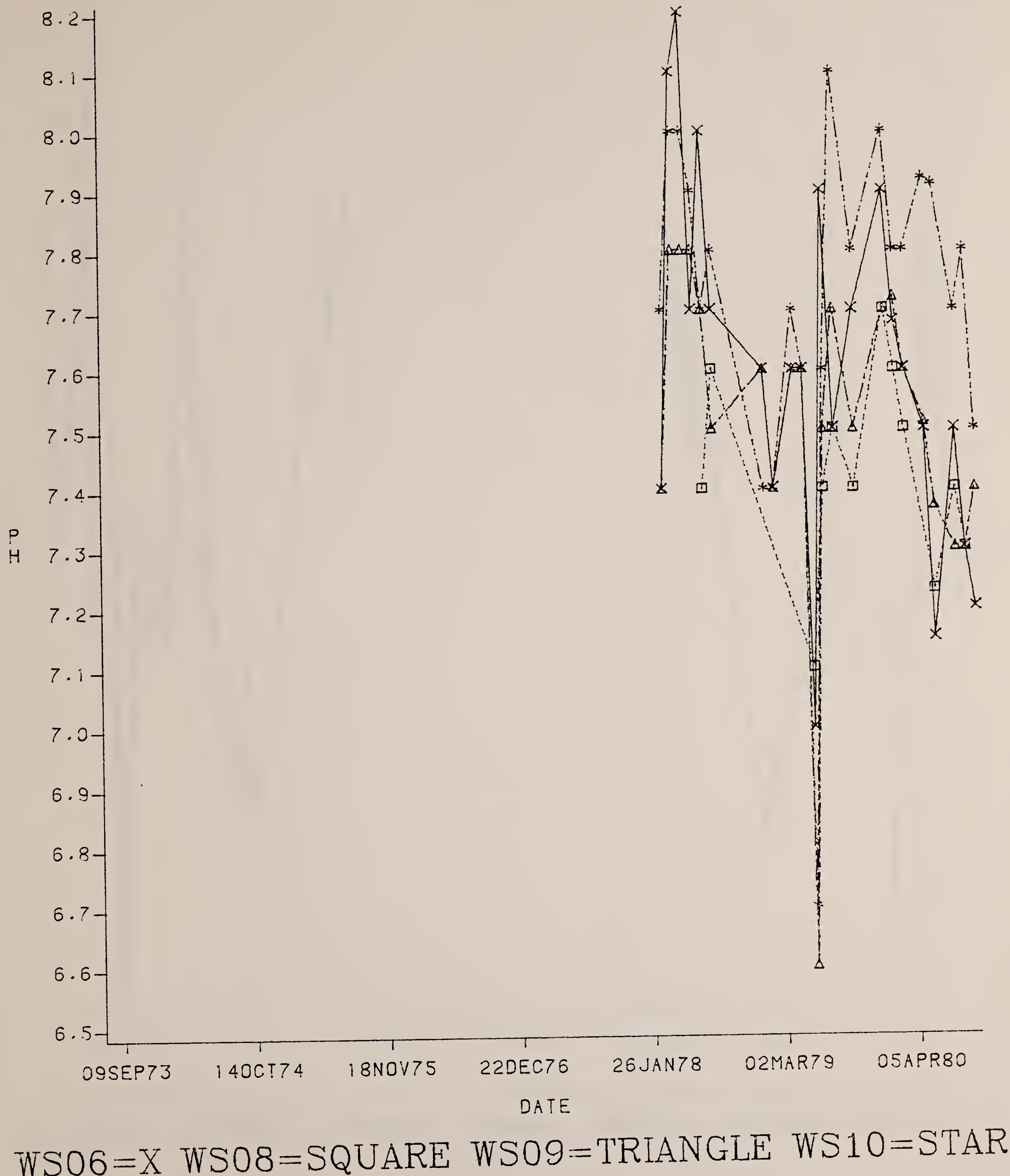
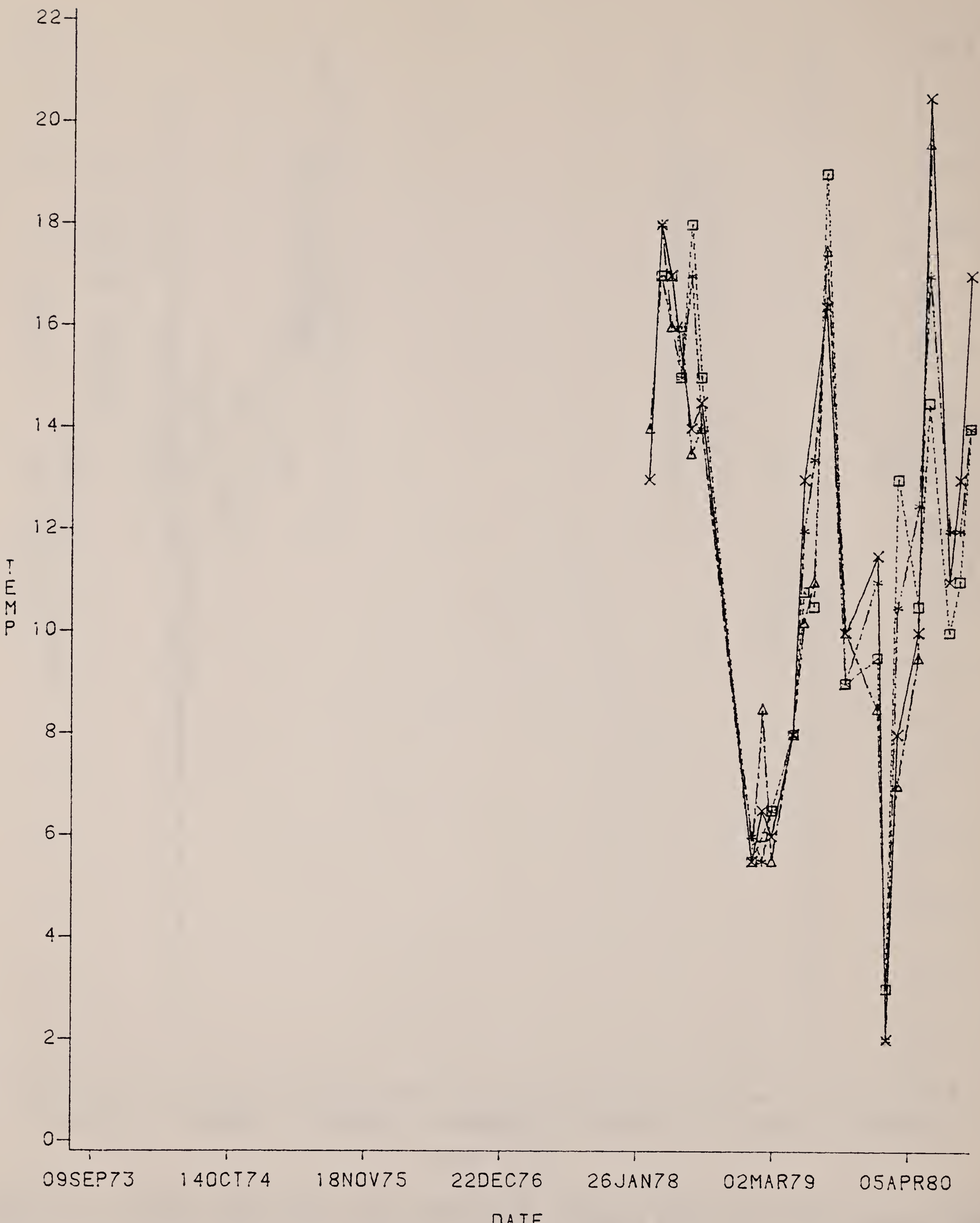


FIGURE A5.3.2-4

Springs Water Quality



WS01=X WS02=SQUARE WS03=TRIANGLE WS04=STAR

FIGURE A5.3.2-5

Springs Water Quality

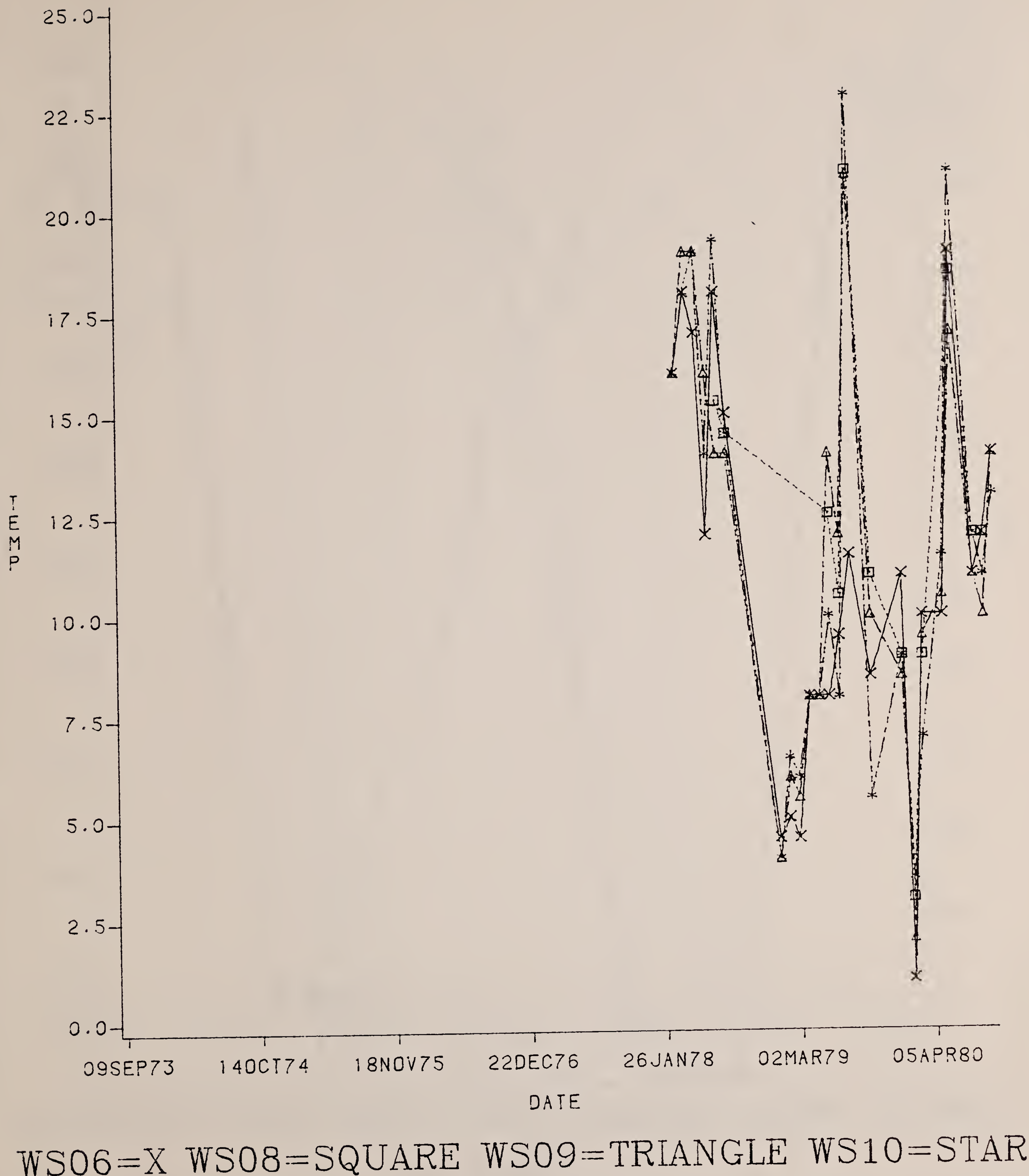


FIGURE A5.3.2-6
Springs Water Quality

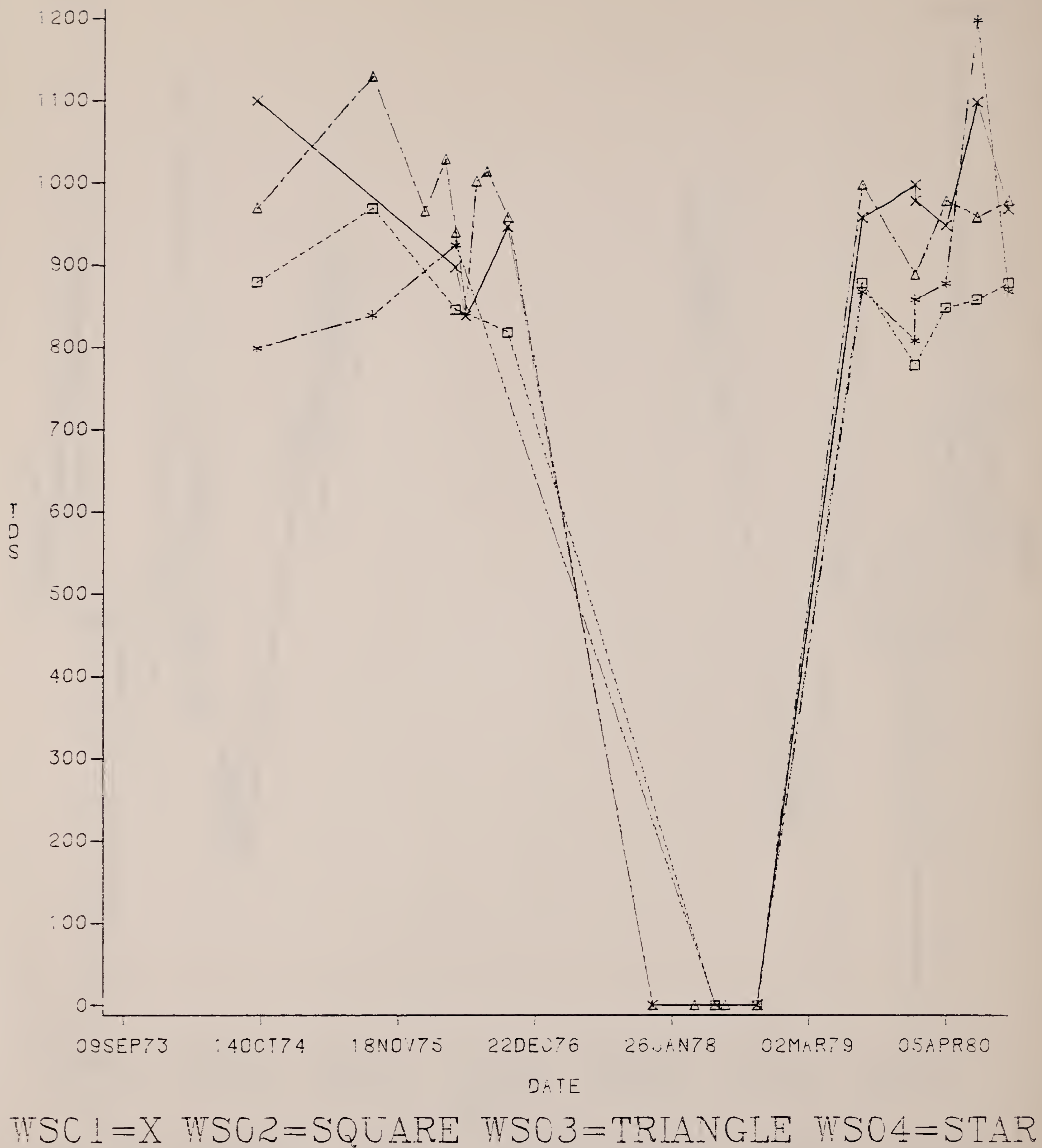


FIGURE A5.3.2-7

Springs Water Quality

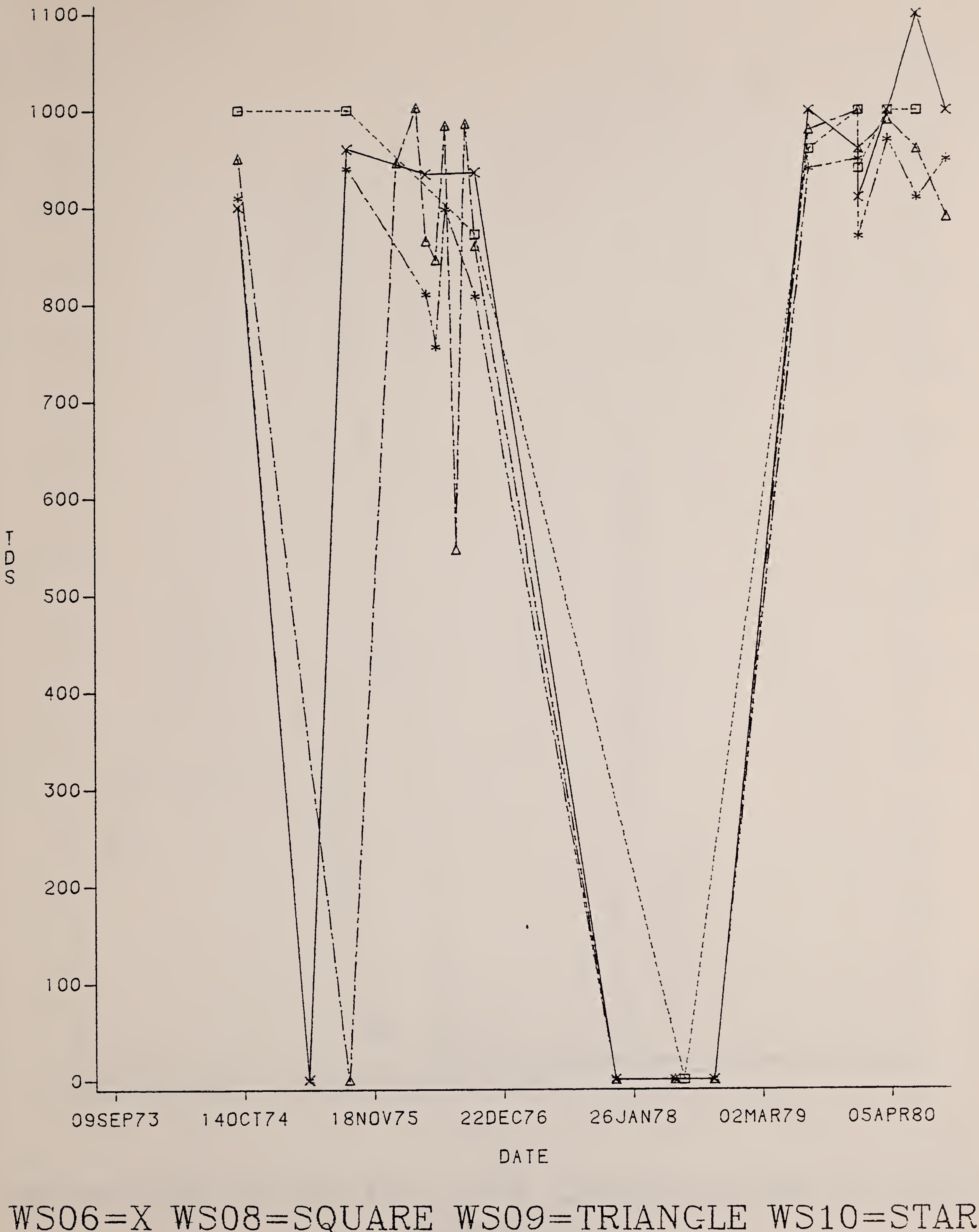
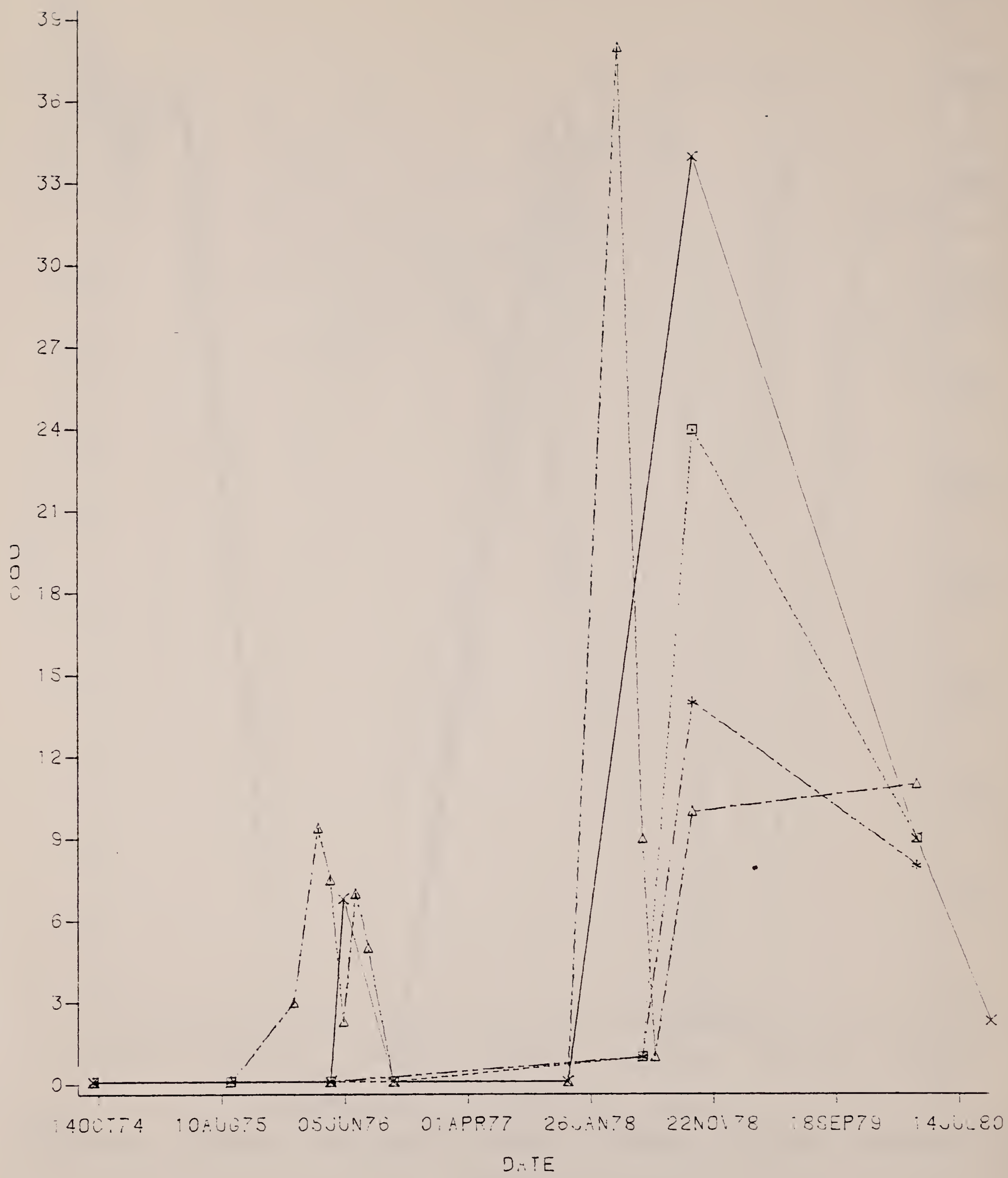


FIGURE A5.3.2-8
Springs Water Quality



WSC1=X WSC2=SQUARE WSC3=TRIANGLE WSC4=STAR

FIGURE A5.3.2-9

Springs Water Quality

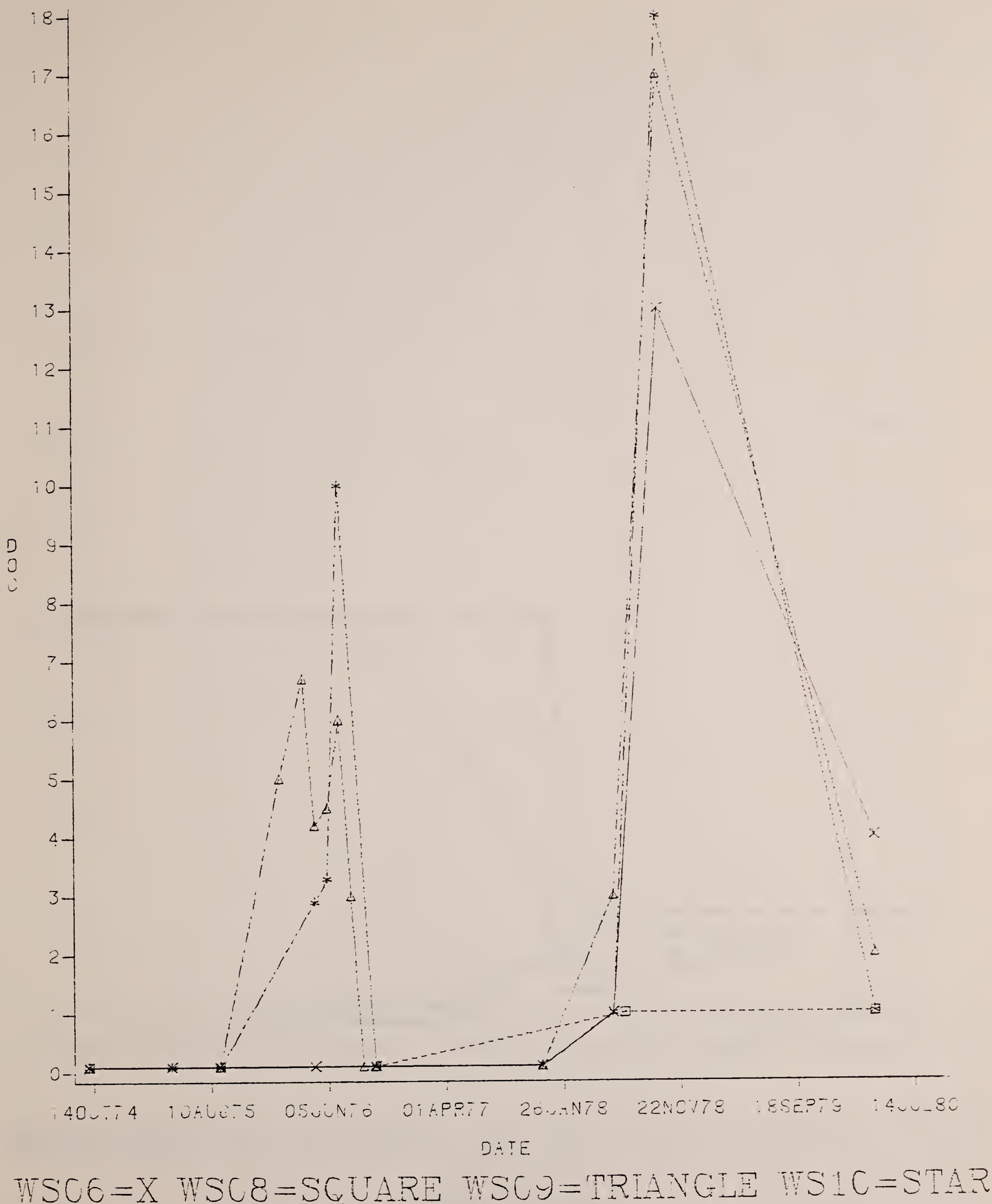


FIGURE A5.3.2-10

Springs Water Quality

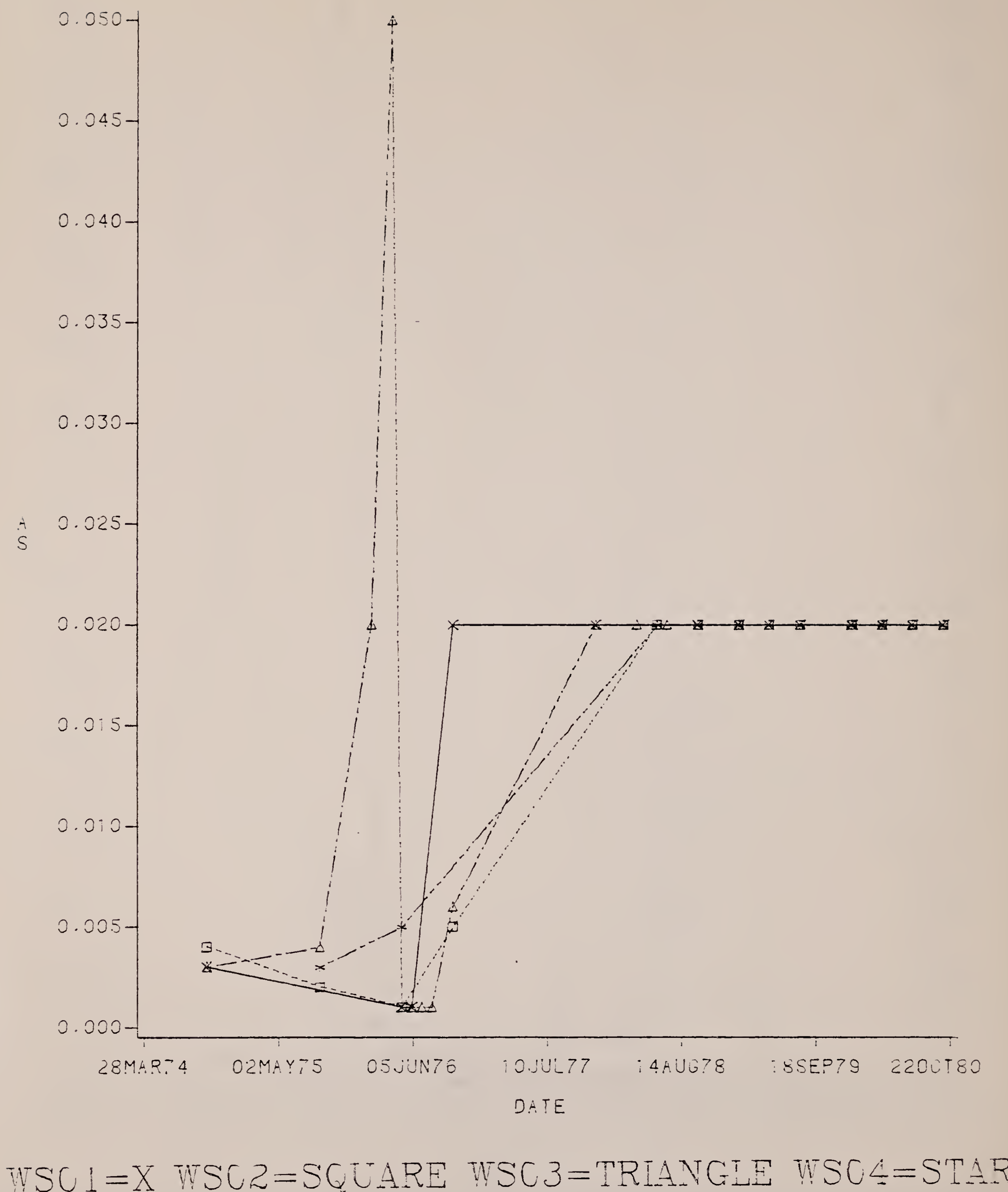
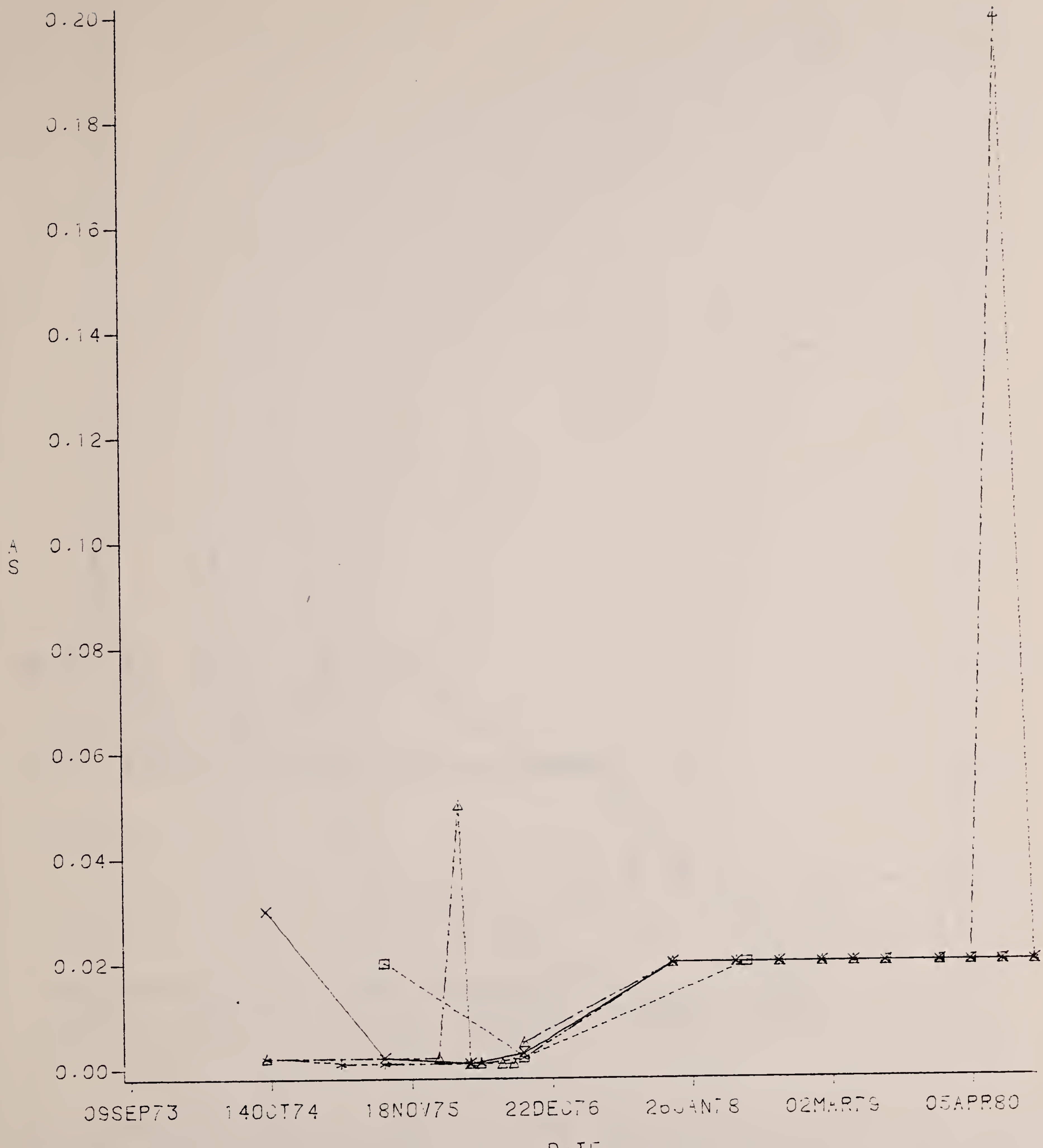


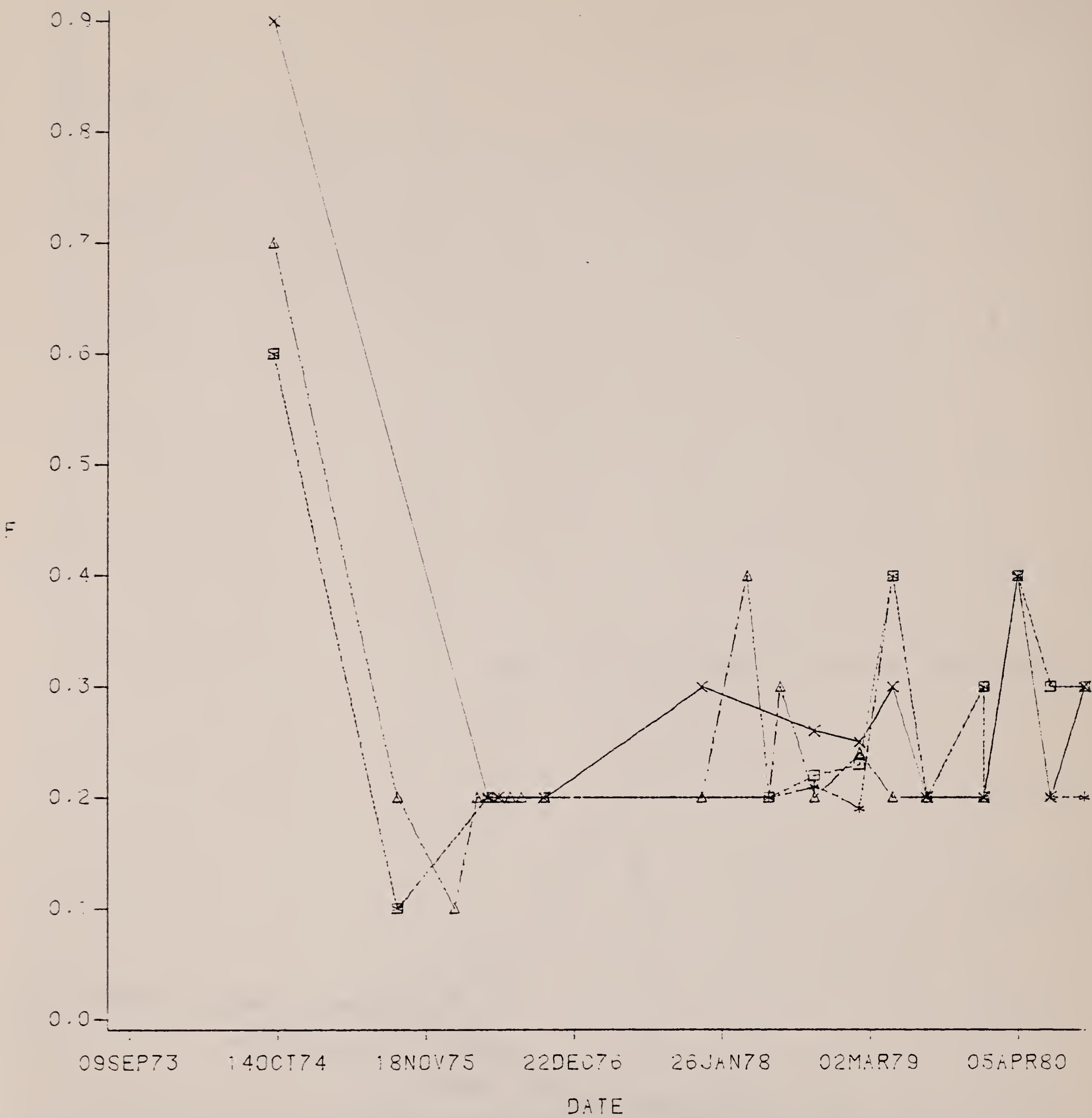
FIGURE A5.3.2-11
Springs Water Quality



WSC6=X WSC8=SQUARE WSC9=TRIANGLE WS10=STAR

FIGURE A5.3.2-12

Springs Water Quality



WS01=X WS02=SQUARE WS03=TRIANGLE WS04=STAR

FIGURE A5.3.2-13
Springs Water Quality

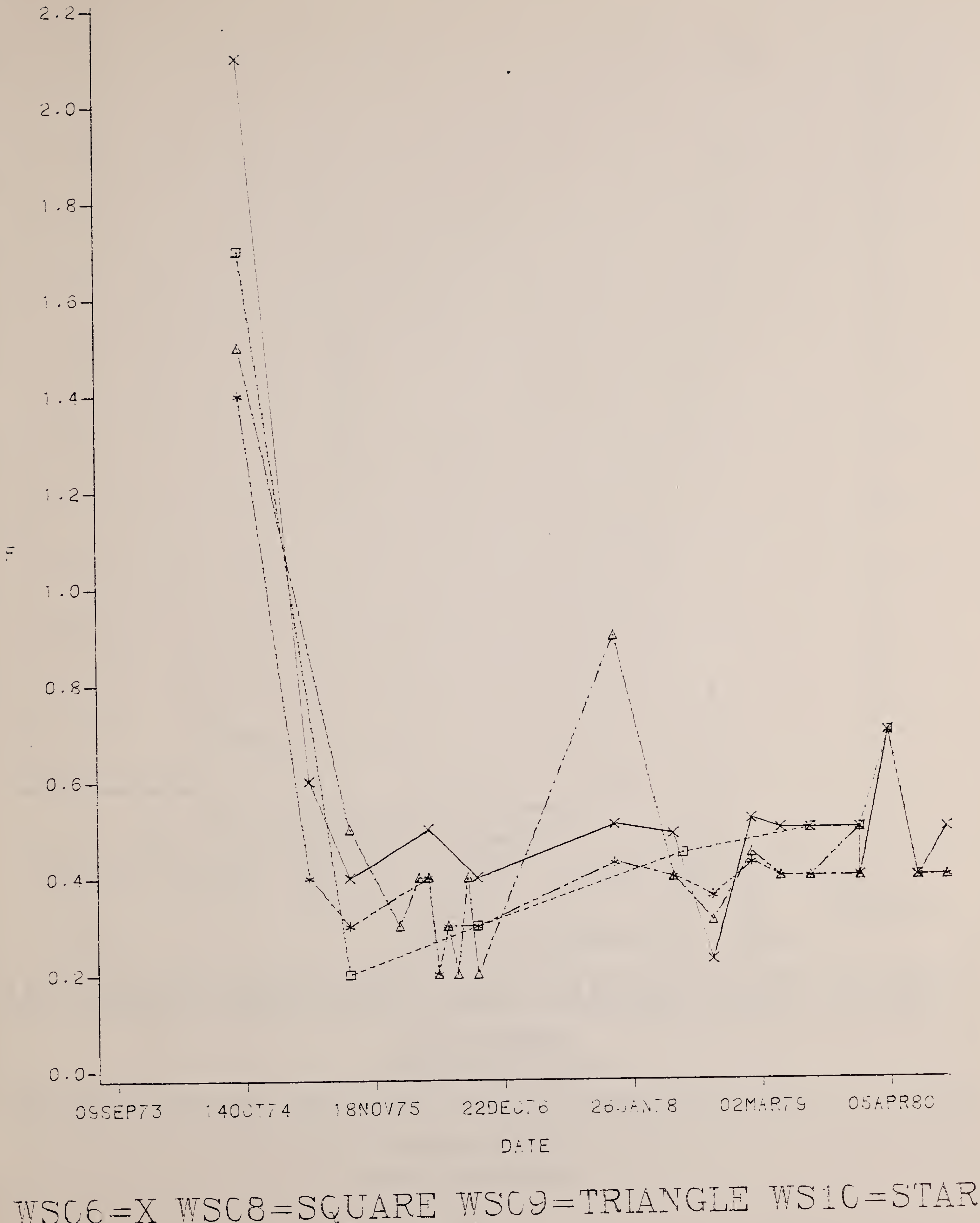
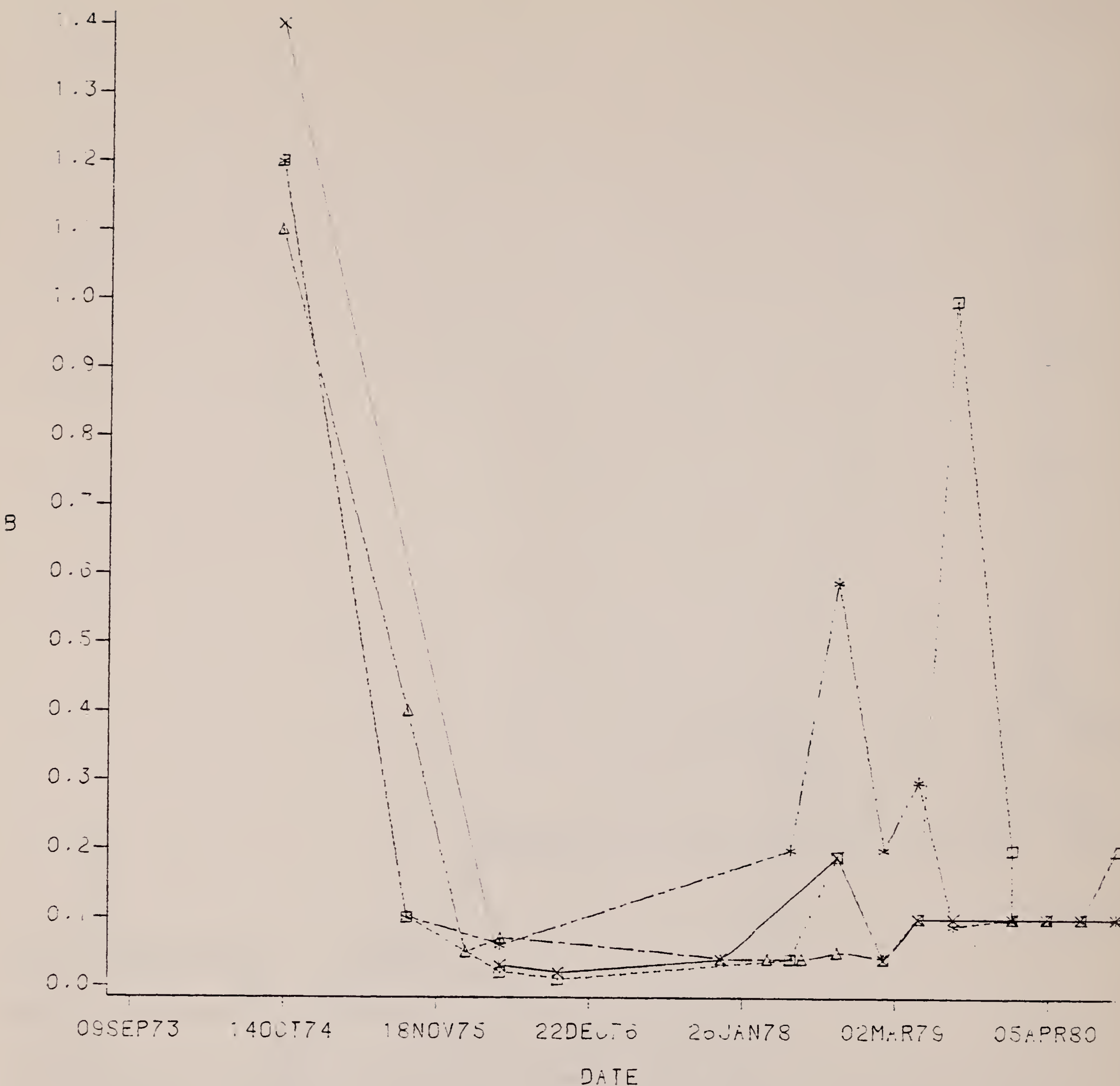


FIGURE A5.3.2-14

Springs Water Quality



WSC1=X WSC2=SQUARE WSC3=TRIANGLE WSC4=STAR

FIGURE A5.3.2-15

Springs Water Quality

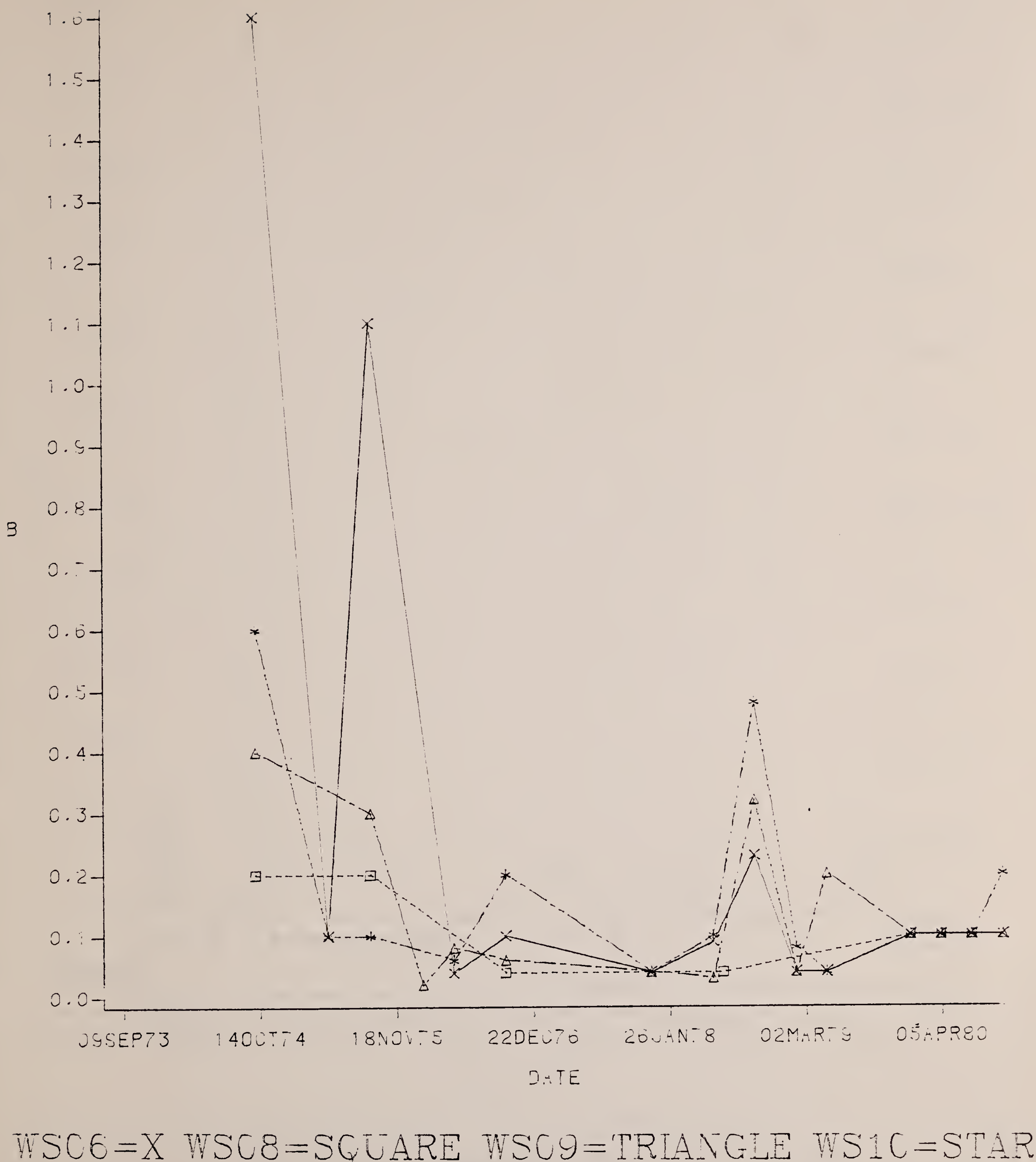
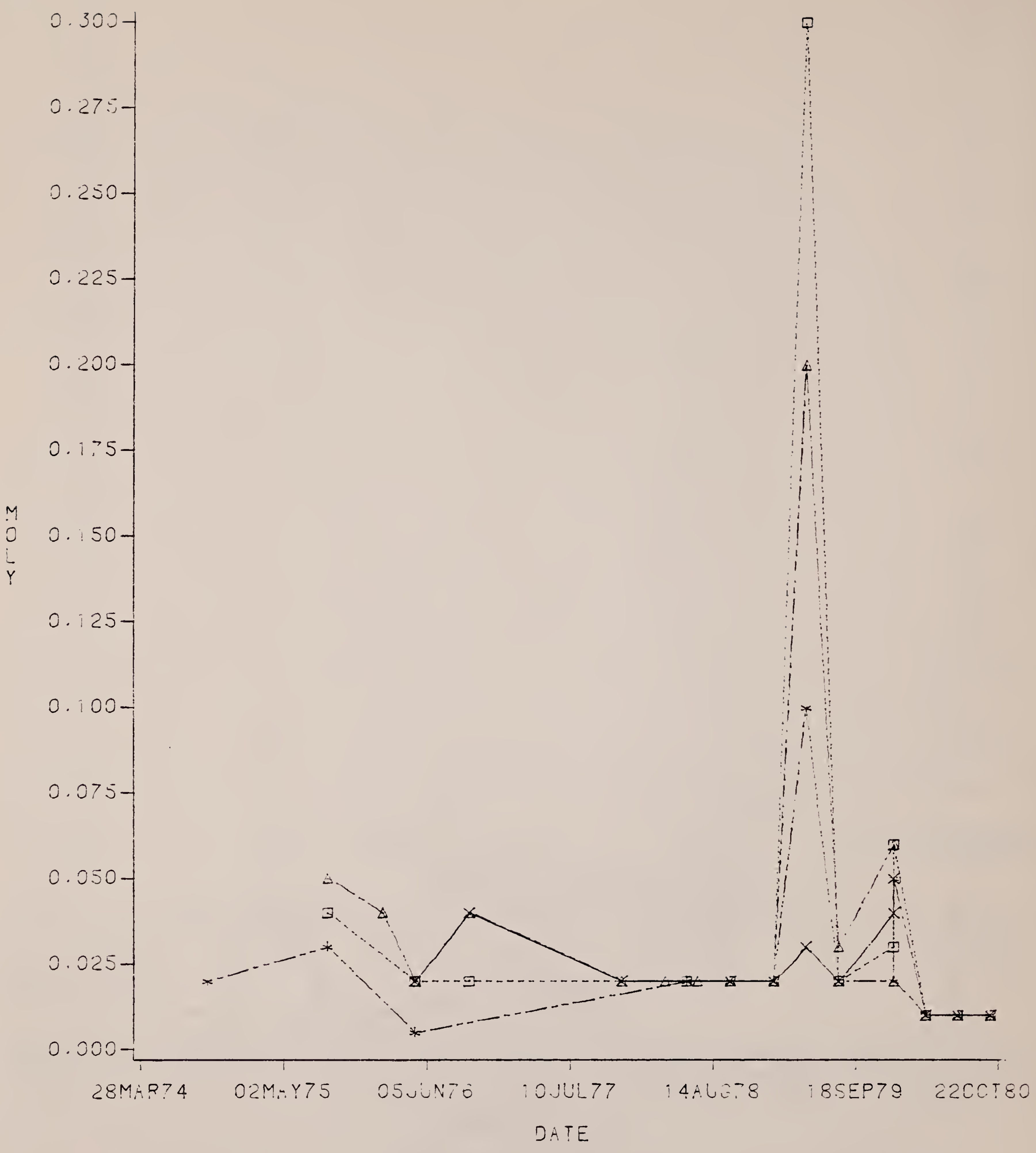


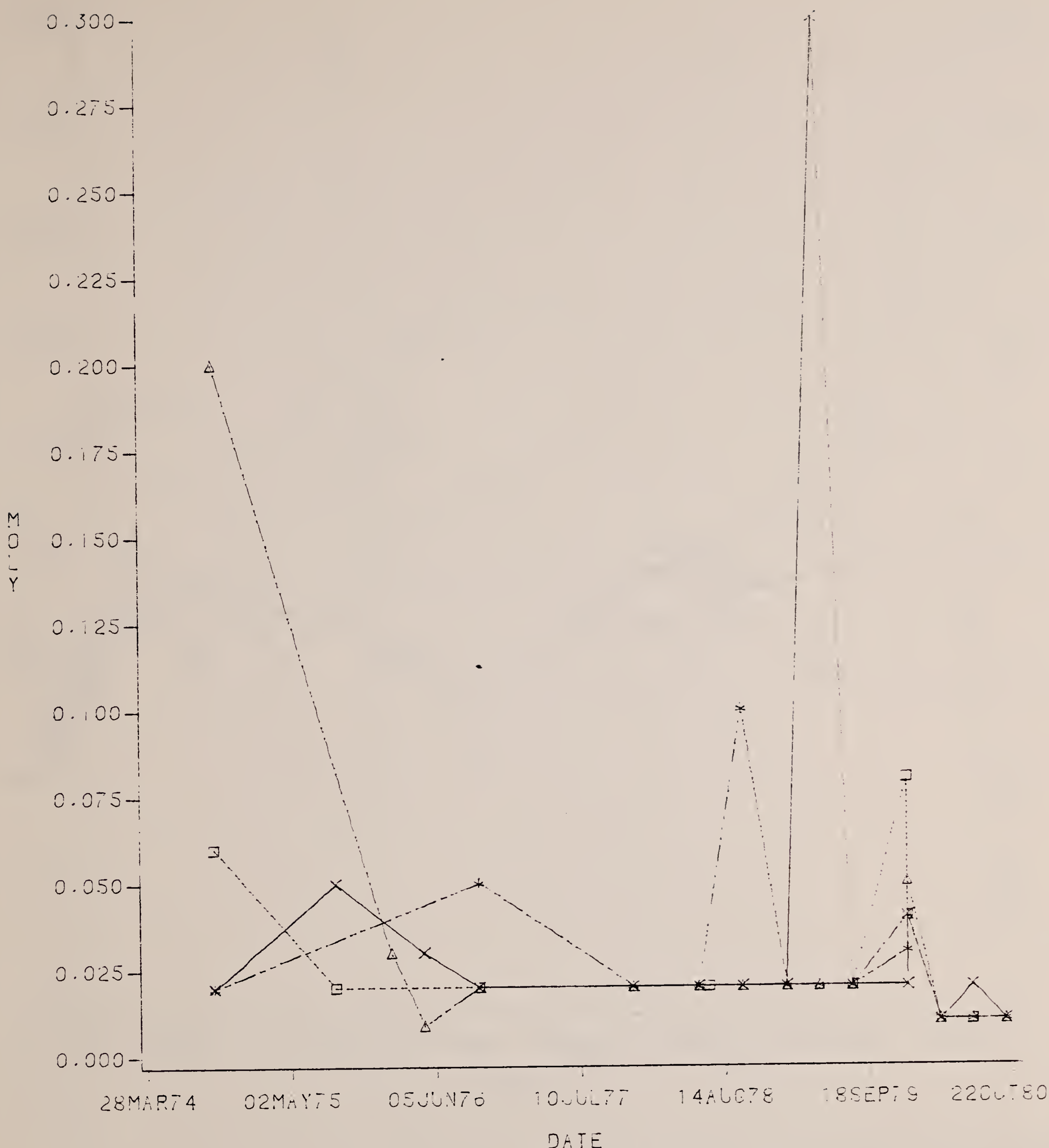
FIGURE A5.3.2-16

Springs Water Quality



WS01=X WS02=SQUARE WS03=TRIANGLE WS04=STAR

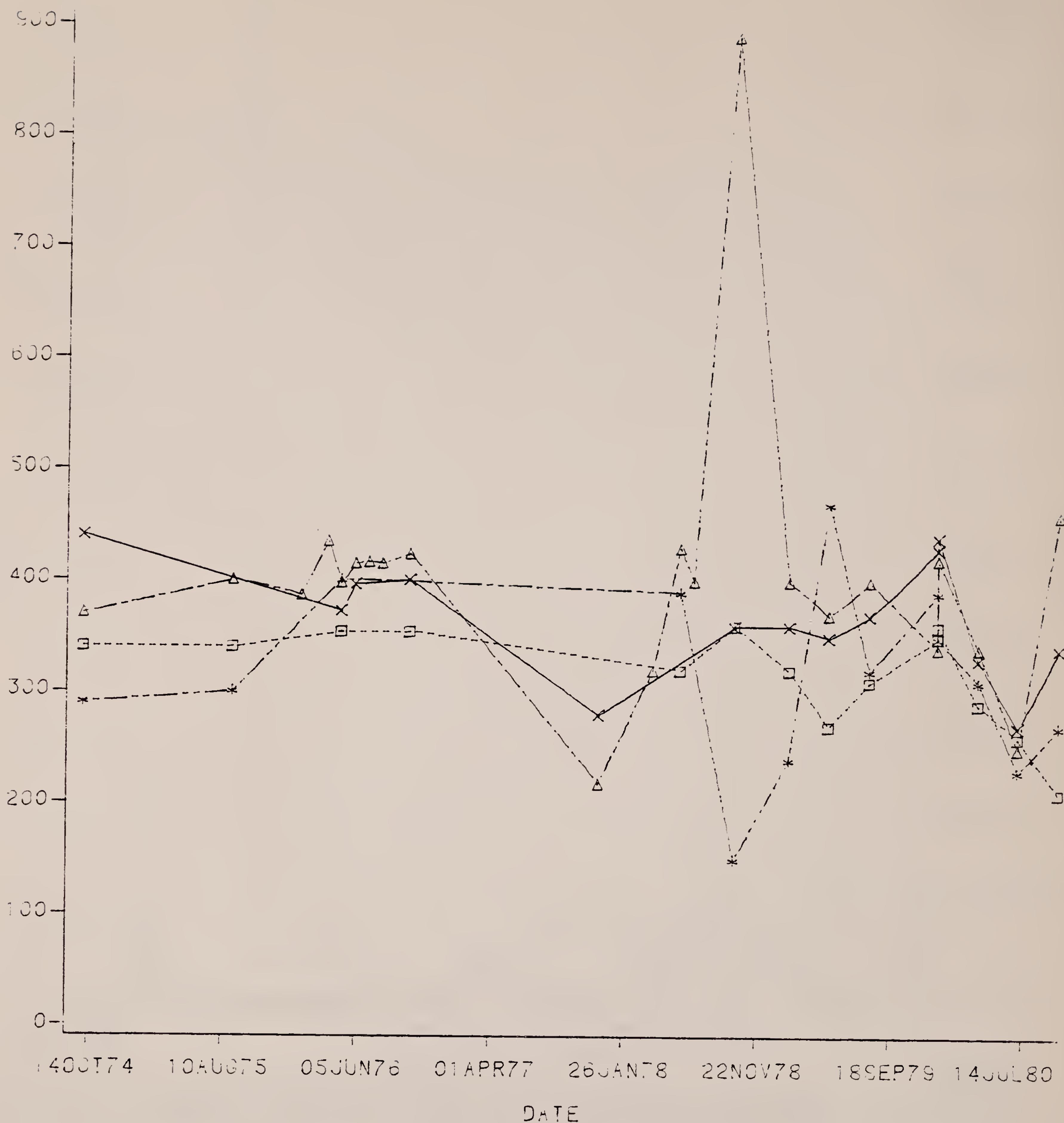
FIGURE A5.3.2-17
Springs Water Quality



WSC6=X WSC8=SQUARE WSC9=TRIANGLE WS10=STAR

FIGURE A5.3.2-18

Springs Water Quality



WSC1=X WSC2=SQUARE WSC3=TRIANGLE WSC4=STAR

FIGURE A5.3.2-19

Springs Water Quality

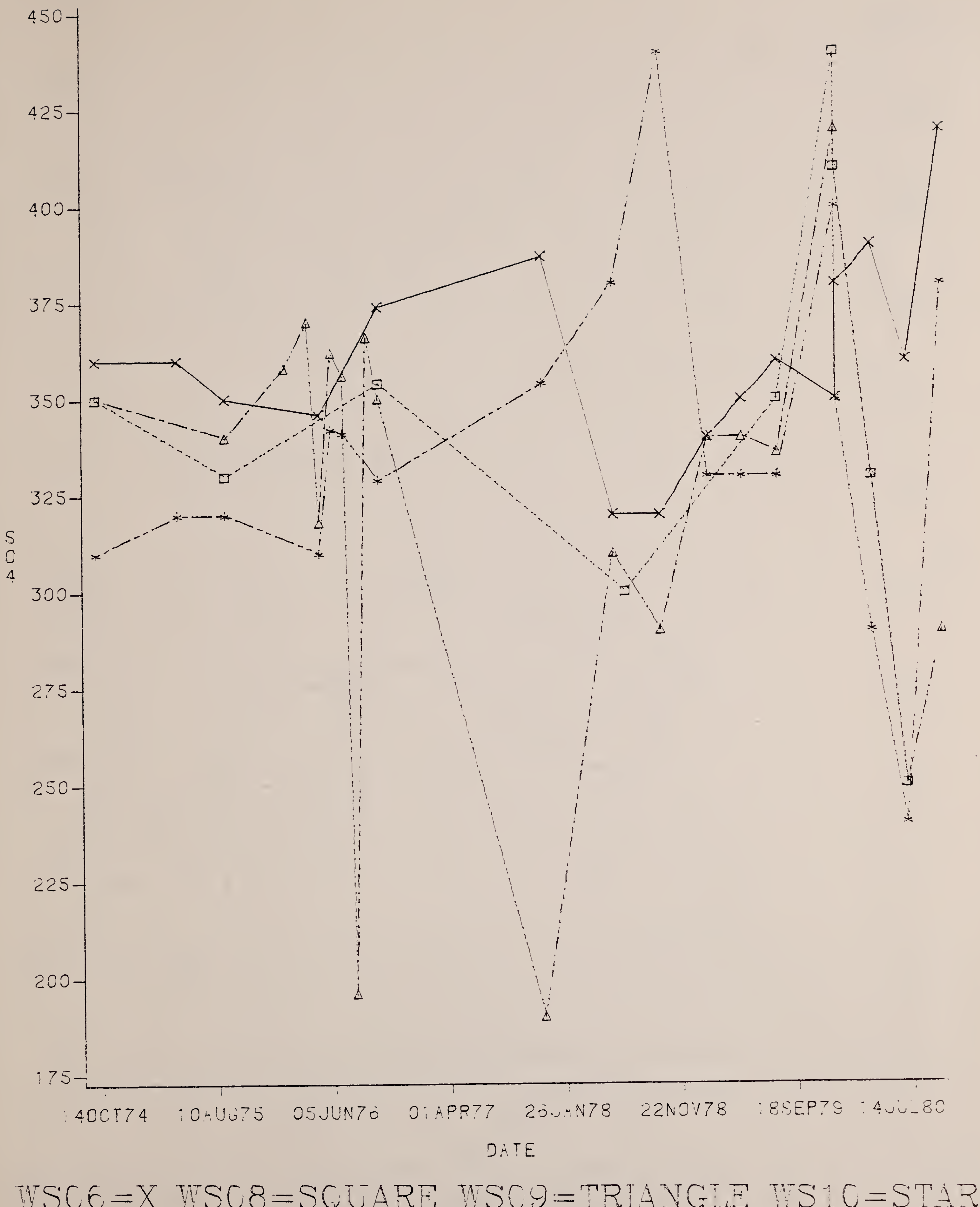


FIGURE A5.3.2-20

Springs Water Quality

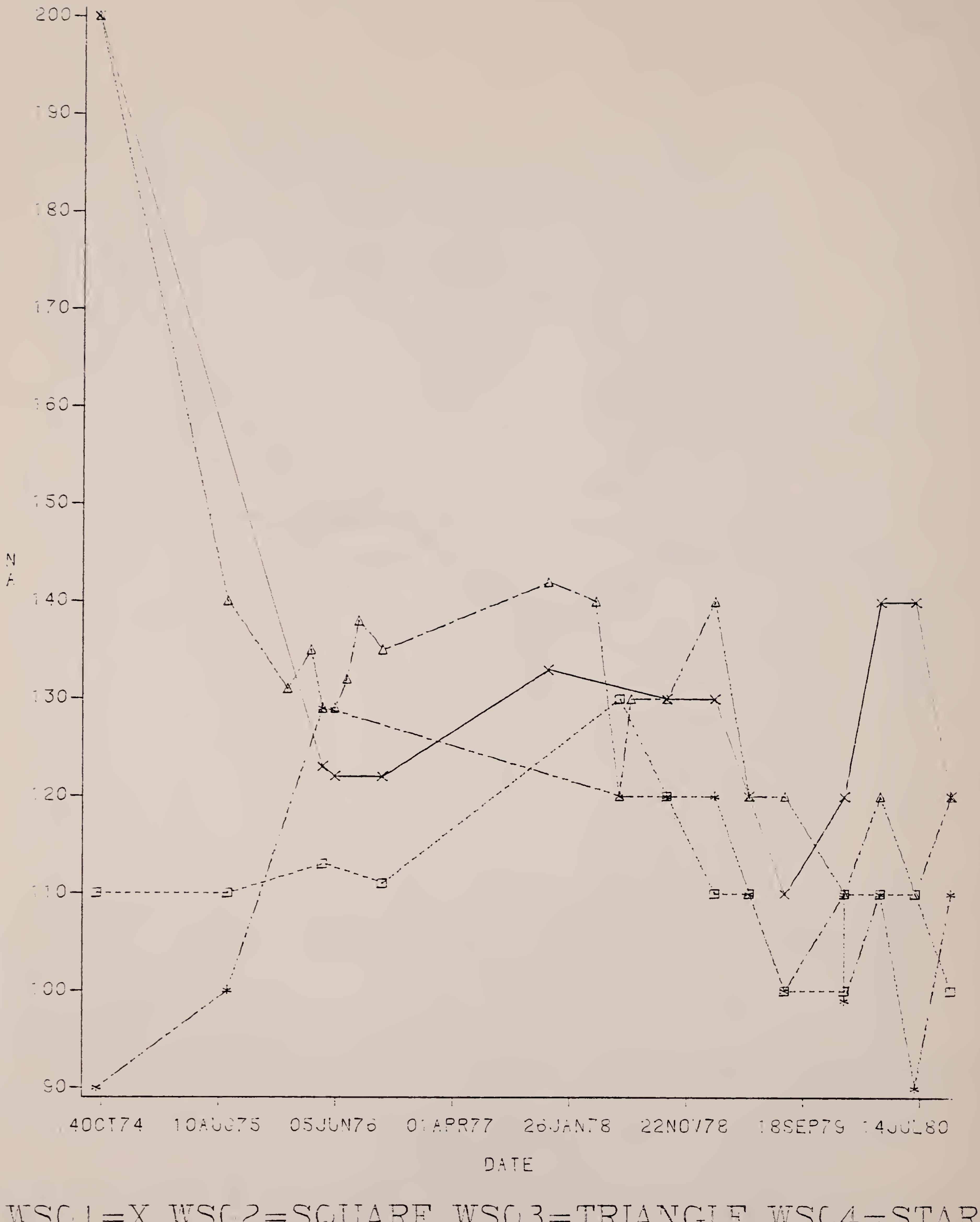


FIGURE A5.3.2-21

Springs Water Quality

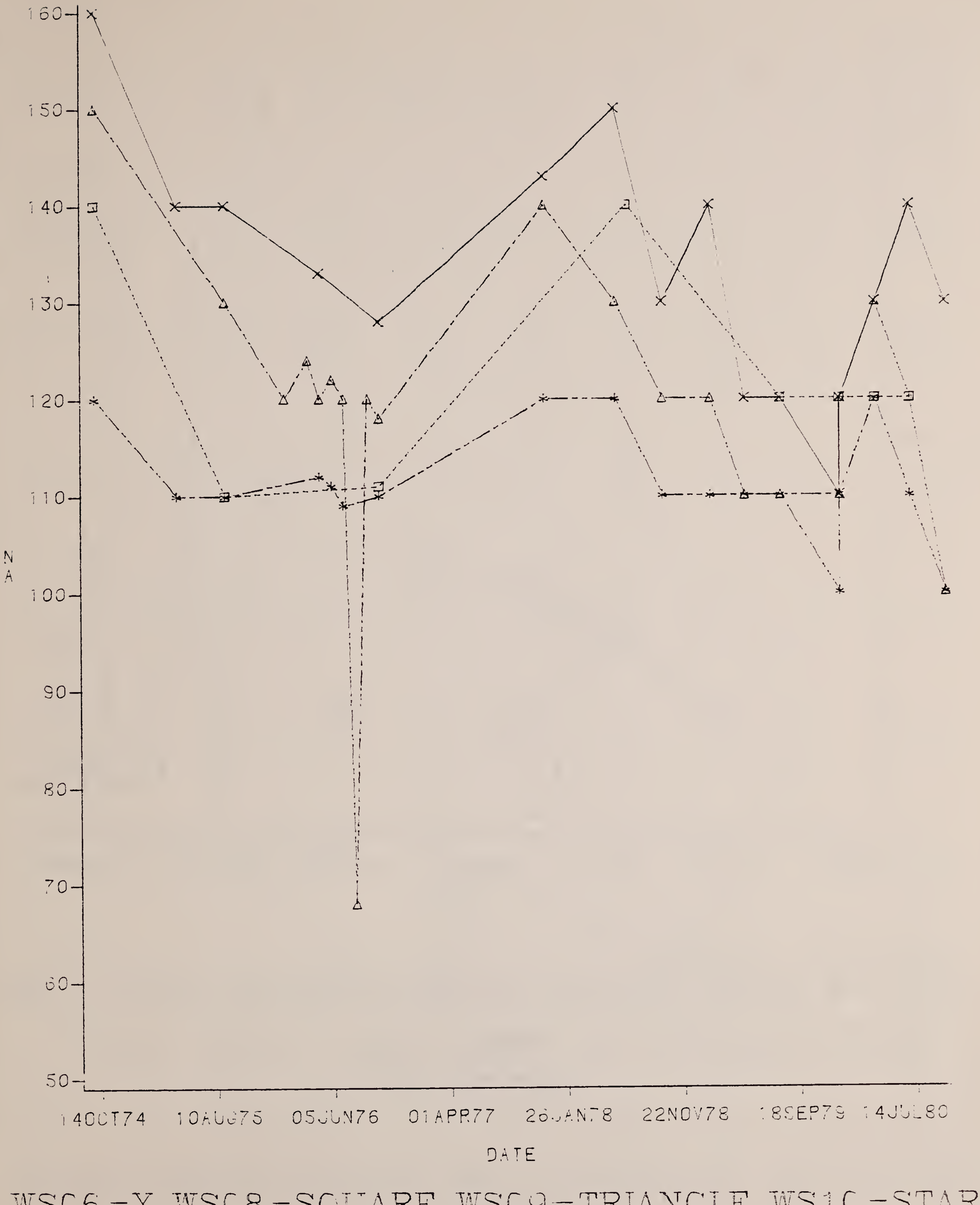
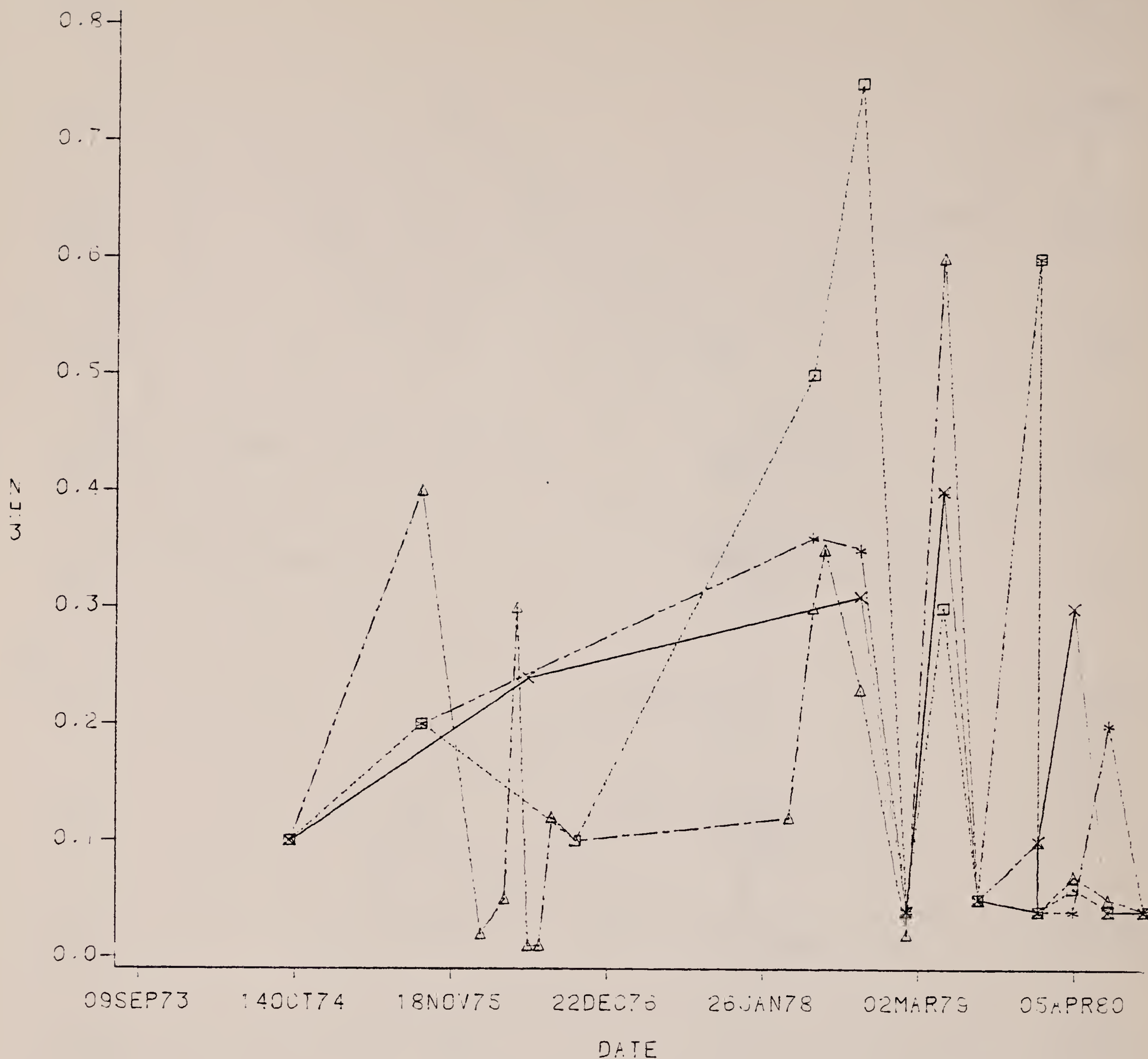


FIGURE A5.3.2-22

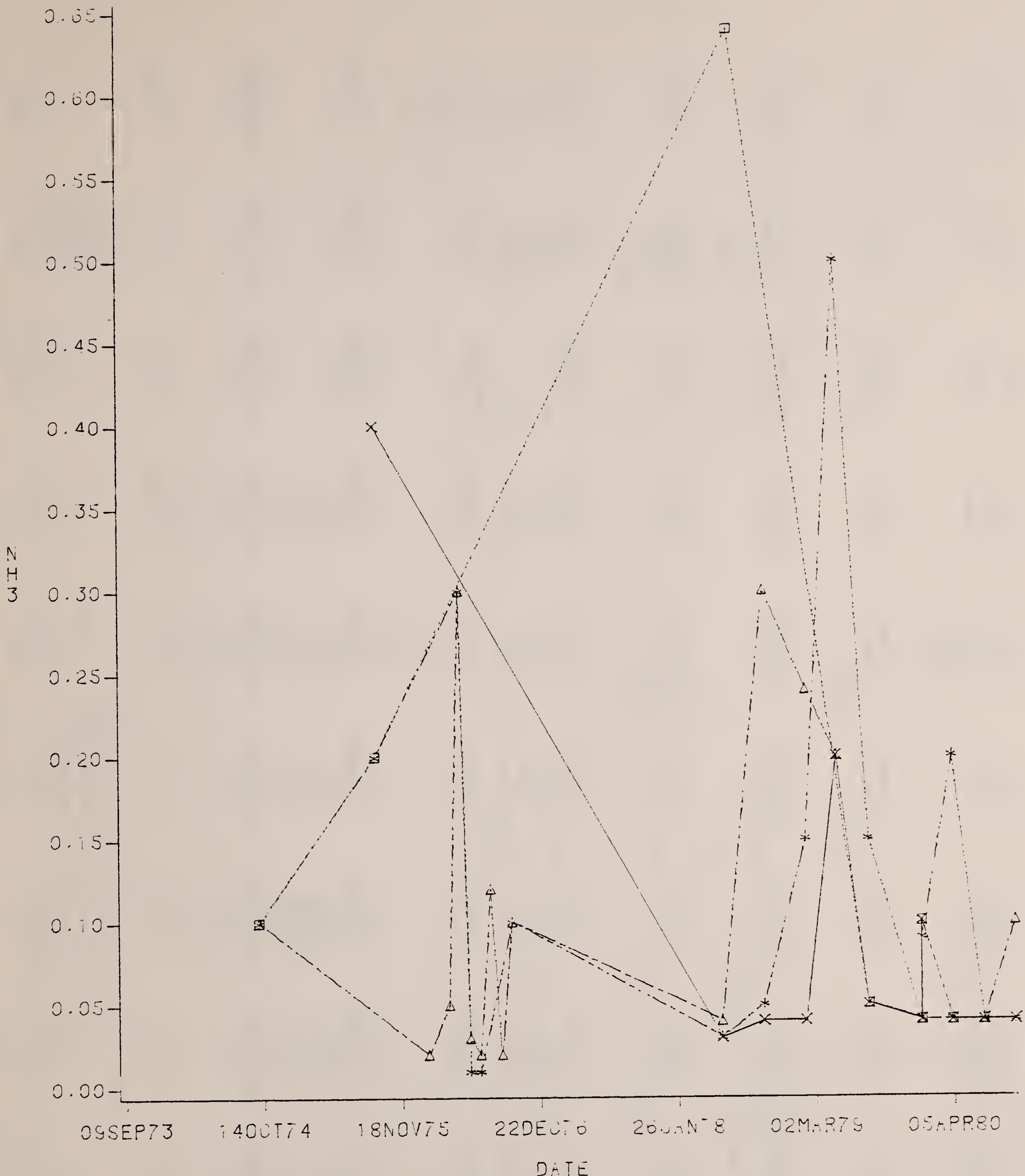
Springs Water Quality



WS01=X WS02=SQUARE WSC3=TRIANGLE WSC4=STAR

FIGURE A5.3.2-23

Springs Water Quality



WS06=X WS08=SQUARE WS09=TRIANGLE WS10=STAR

FIGURE A5.3.2-24

Springs Water Quality

TABLE A5.3.2-1

LONG TERM TIME SERIES ANALYSIS FOR WATER QUALITY OF SPRINGS AND SEEPS

Dependent Variable		WS01	WS02	WS03	WS04	WS06	WS07	WS08	WS09	WS10
pH	1.	7.7922/18	8.0305/19	7.6850/16	7.7961/18	7.5871/21	7.3350/4	7.4478/9	7.5182/22	7.7205/21
	2.	0.7430	0.0642	0.1234	0.2859	0.0071	0.0848	0.3263	0.1517	0.9534
	3.					-0.0006				
	4.					11.4793				
	5.					0.3240				
TEMP	1.	11.6263/19	11.2900/19	10.7824/17	11.7444/18	10.9318/22	12.5000/4	11.7778/9	11.6913/23	11.8045/22
(^{o}C)	2.	0.7910	0.3535	0.1148	0.5884	0.2865	0.5744	0.8697	0.1655	0.2392
	3.									
	4.									
	5.									
SPC	1.	1210.9909/11	1113.7182/11	1200.2112/18	1076.9900/10	1275.3769/13	1168.5231/13	1347.4000/5	1243.3278/18	1180.9933/15
(μmhos)	2.	0.8280	0.7390	0.3830	0.9231	0.8797	0.9872	0.3103	0.9585	0.9595
	3.									
	4.									
	5.									
DOC	1.	6.4625/8	4.8000/7	6.8533/15	3.7833/6	1.9333/9	6.3200/10	-0.0600/5	3.6347/14	3.0636/11
(mg/l)	2.	0.4293	0.1499	0.1424	0.1147	0.1184	0.6252	0.7351	0.3222	0.5200
	3.									
	4.									
	5.									
AS	1.	-0.0125/14	-0.1343/14	-0.0079/22	-0.0160/12	-0.0096/15	-0.0094/16	-0.0173/8	-0.0156/19	-0.0101/17
(mg/l)	2.	0.0102	0.0001	0.0016	0.0001	0.0001	0.0094	0.2224	0.0176	0.0003
	3.	-0.00001	-0.00001	-0.00002	-0.00001	-0.00002	-0.00001		-0.00004	-0.00001
	4.	0.0736	0.0818	0.1066	0.0836	0.1283	0.0875		0.2404	0.0817
	5.	0.4360	0.8392	0.3980	0.7936	0.6904	0.3922		0.2889	0.5913
F	1.	0.2936/14	0.2750/14	0.2564/22	0.2615/13	0.5781/16	0.5375/16	0.5833/9	0.4552/21	0.4511/18
(mg/l)	2.	0.0885	0.8367	0.8825	0.4338	0.0727	0.3037	0.2802	0.4335	0.4379
	3.									0.0001
	4.									-0.3778
	5.									0.9983
B	1.	0.1646/13	0.2229/14	0.1306/16	0.2185/13	0.2533/15	0.1727/15	0.1100/8	0.1140/15	0.1547/15
(mg/l)	2.	0.0209	0.2805	0.0086	0.0270	0.0171	0.0416	0.1595	0.0995	0.2395
	3.	-0.0004		-0.0003	-0.0003	-0.0004	-0.0003			
	4.	2.6134		1.9252	2.2372	2.7575	2.3988			
	5.	0.3975		0.3993	0.0270	0.3648	0.2821			
TDS	1.	812.0666/12	712.1500/12	728.0750/20	732.3455/11	692.8286/14	705.1857/14	863.5444/9	724/4526/19	669.4750/16
(mg/l)	2.	0.8346	0.7923	0.4408	0.7519	0.3896	0.9230	0.9913	0.7081	0.5085
	3.									
	4.									
	5.									

NOTE: Entries in the table mean the following:

1. Mean/Number of paired observations
2. $\hat{\alpha}$ - to be compared with selected α. ($\alpha = 0.05$)
3. Slope - slope is units per month
4. Intercept
5. r^2 value

TABLE [illegible].3.2-[illegible]t.)

LONG TERM TIME SERIES ANALYSIS FOR WATER QUALITY OF SPRINGS AND SEEPS

Dependent Variable		WS01	WS02	WS03	WS04	WS06	WS07	WS08	WS09	WS10
MOLY (mg/l)	1.	0.0092/12	0.0277/13	0.0206/17	0.0027/13	0.0280/15	0.0014/14	0.0156/9	0.0173/15	
	2.	0.8087	0.9389	0.6794	0.9918	0.7958	0.4544	0.7594	0.0206	
	3.								-0.00005	
	4.								0.3519	
	5.								0.3481	
NA (mg/l)	1.	130.7143/14	110.2857/14	130.9545/22	108.3077/13	133.3750/16	130.0000/16	122.3333/9	119.1429/21	111.2222/18
	2.	0.0660	0.3271	0.0003	0.9328	0.0209	0.0298	0.6834	0.3145	0.0282
	3.			-0.0196		-0.0100	-0.0068			
	4.			259.8365		200.3140	175.7720			
	5.			0.4807		0.3261	0.2947			
SO_4 (mg/l)	1.	367.2143/14	317.0000/14	404.5000/22	316.2308/13	360.4375/16	392.7500/16	346.0000/9	327.2381/21	338.6667/18
	2.	0.1762	0.0429	0.9021	0.8361	0.3382	0.7045	0.9204	0.7939	0.5906
	3.		-0.0348	-0.0052						
	4.		553.2758	439.0472						
	5.		0.2993	0.0008						
NH_3 (mg/l)	1.	0.1127/11	0.1846/13	0.1343/21	0.1727/11	0.0400/11	0.4915/13	0.1088/8	0.0637/19	0.1106/16
	2.	0.4734	0.7375	0.5887	0.5246	0.0053	0.6425	0.4280	0.5580	0.6224
	3.					-0.0002				
	4.					1.5583				
	5.					0.5977				

Dependent Variable		WS11	WS12
pH	1.	7.3500/5	7.6825/4
	2.	0.1845	0.8551
	3.		
	4.		
	5.		
TEMP (°C)	1.	12.2000/5	14.5000/4
	2.	0.8537	0.5750
	3.		
	4.		
	5.		
SPC (μmhos)	1.	947.4750/4	1370.0000/3
	2.	0.0167	0.8616
	3.	0.6290	
	4.	-3512.0727	
	5.	0.9669	
DOC (mg/l)	1.		
	2.		
	3.		
	4.		
	5.		

Dependent Variable		WS11	WS12
AS (mg/l)	1.		
	2.		
	3.		
	4.		
	5.		
F (mg/l)	1.	0.3333/3	
	2.	0.0262	
	3.	0.0001	
	4.	-0.3778	
	5.	0.9983	
B (mg/l)	1.		
	2.		
	3.		
	4.		
	5.		
TDS (mg/l)	1.	990.0000/3	
	2.	0.0596	
	3.		
	4.		
	5.		

Dependent Variable		WS11	WS12
MOLY (mg/l)	1.		
	2.		
	3.		
	4.		
	5.		
NA (mg/l)	1.	153.3333/3	
	2.	0.0262	
	3.	-0.0671	
	4.	615.5702	
	5.	0.9983	
SO_4 (mg/l)	1.	330.0000/3	
	2.	0.7337	
	3.		
	4.		
	5.		
NH_3 (mg/l)	1.		
	2.		
	3.		
	4.		
	5.		

NOTE: Entries in the table mean the following:
1. Mean/Number of paired observations
2. $\hat{a}$ - to be compared with selected α. (α = 0.05)
3. Slope - slope is units per month
4. Intercept
5. r^2 value

FIGURE A 5.3.3-1

ALLUVIAL WELL WATER QUALITY

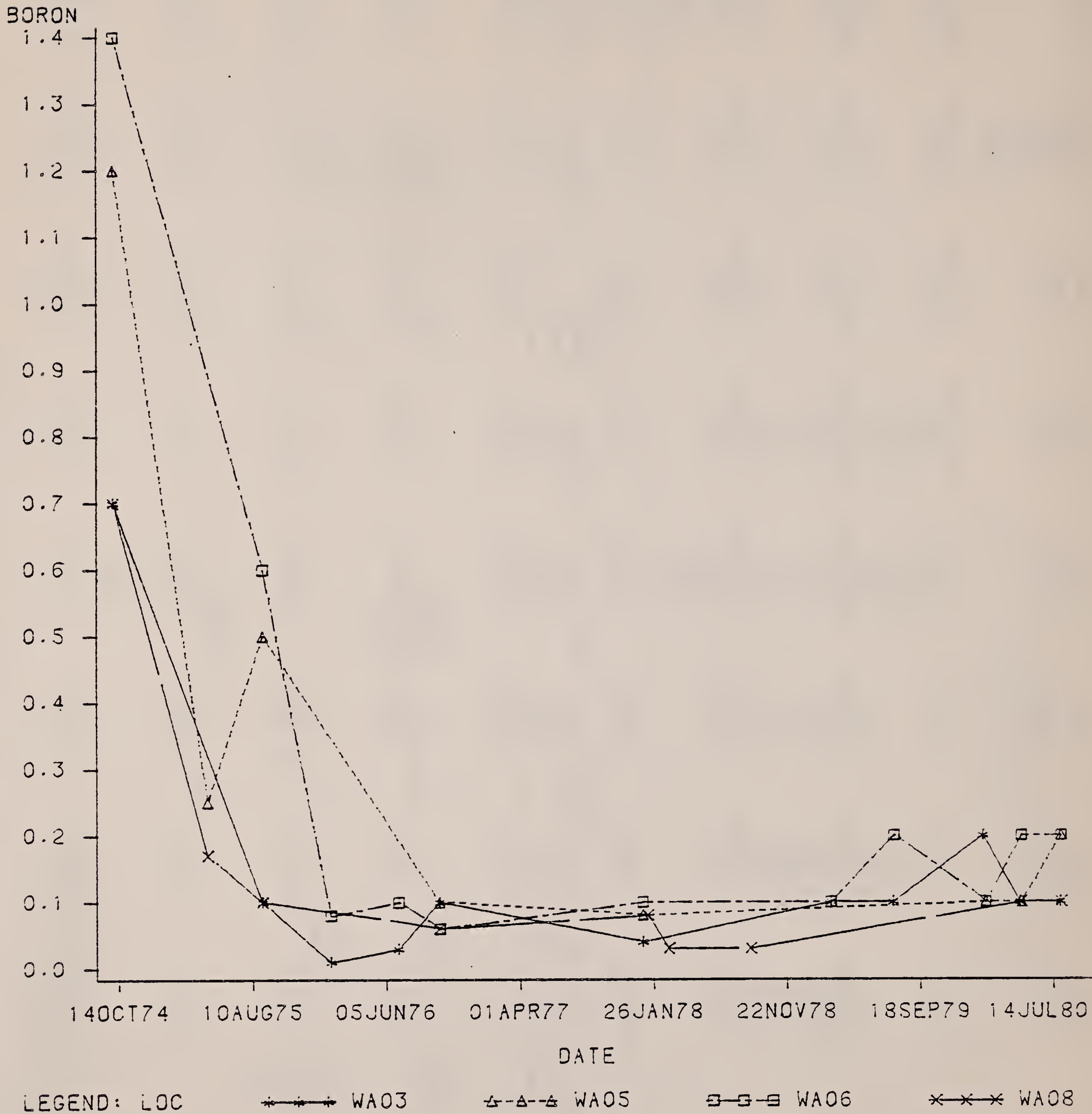


FIGURE A 5.3.3-2

ALLUVIAL WELL WATER QUALITY

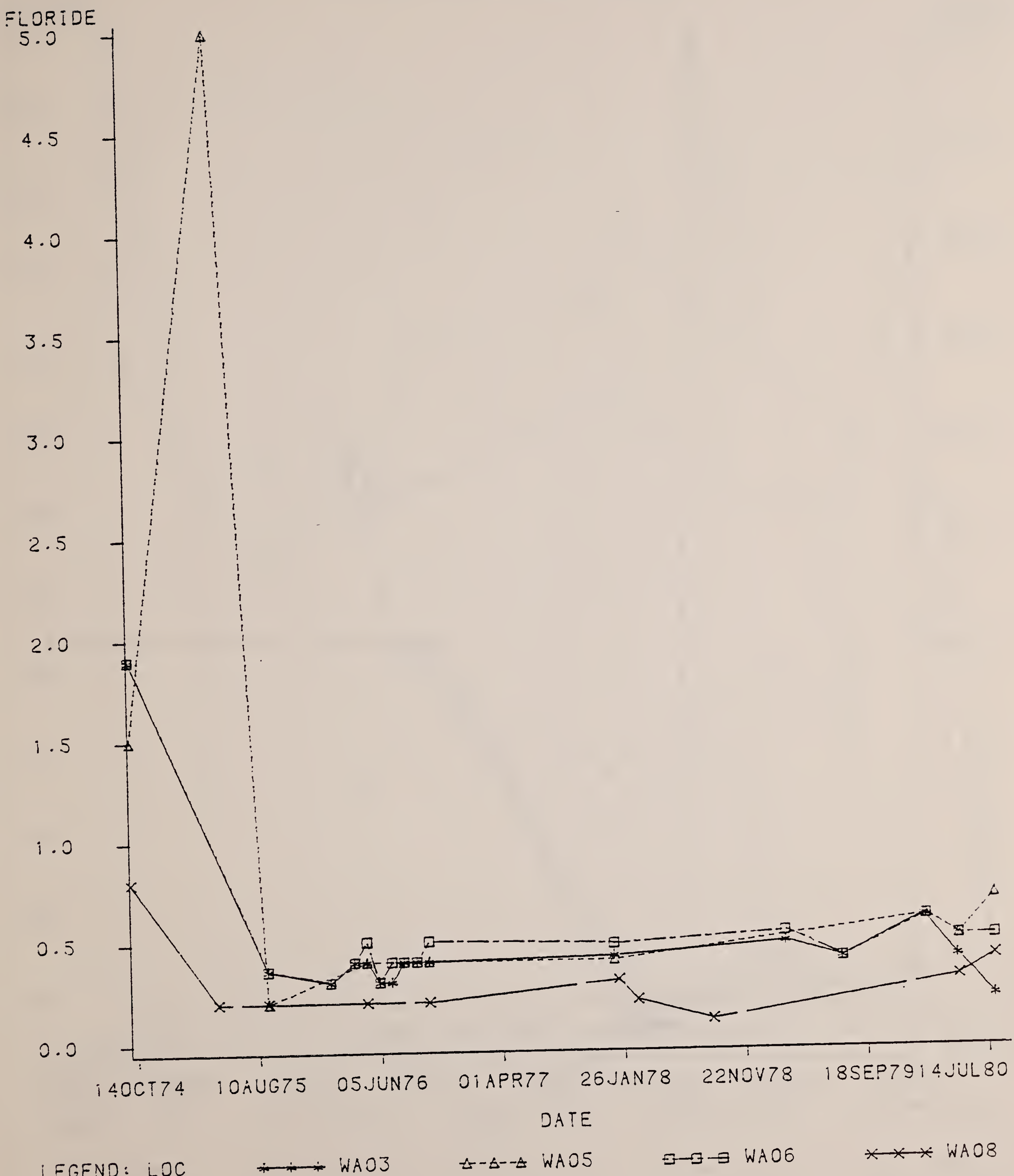


FIGURE A 5.3.3-3

ALLUVIAL WELL WATER QUALITY

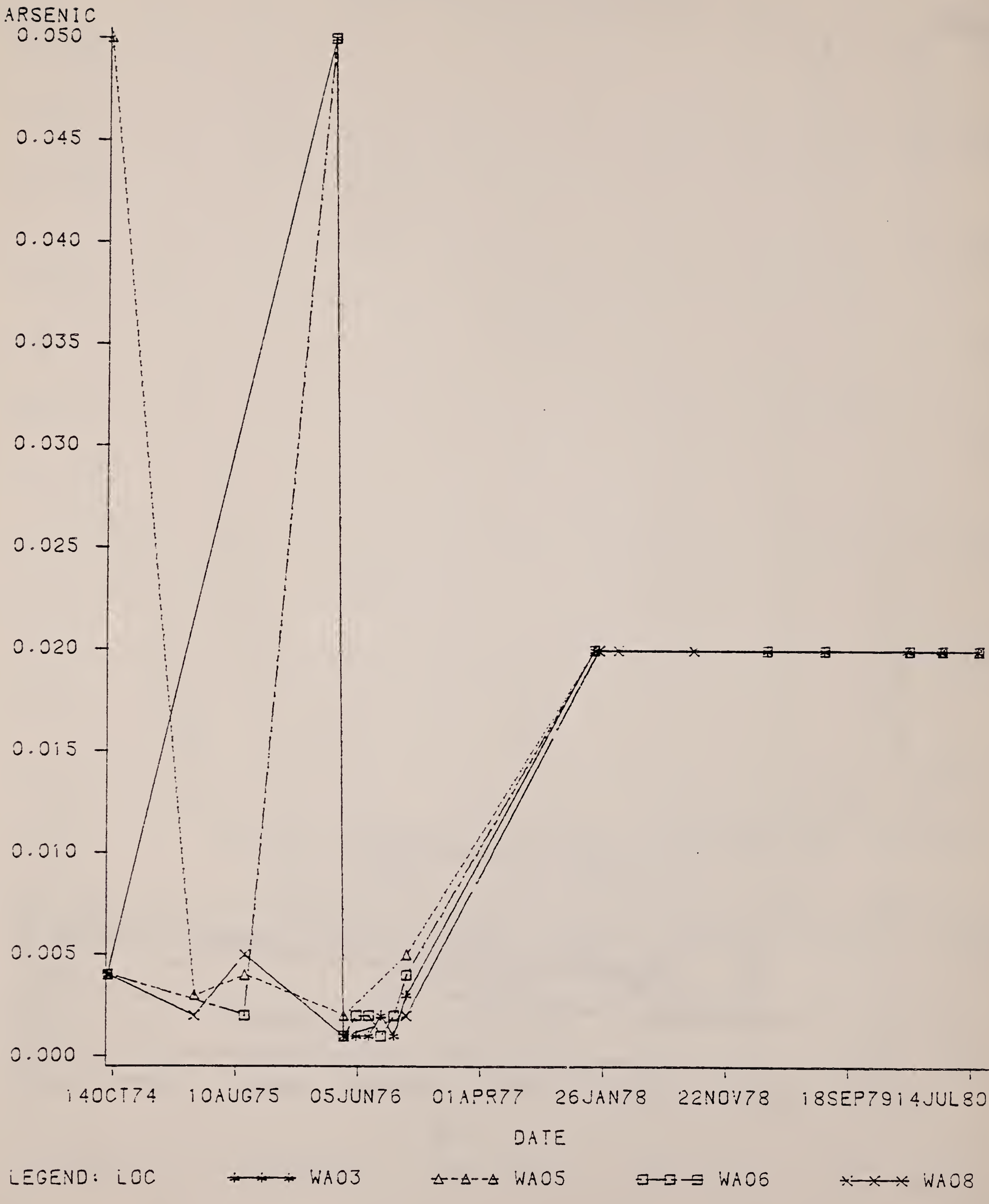


FIGURE A 5.3.3-4

ALLUVIAL WELL WATER QUALITY

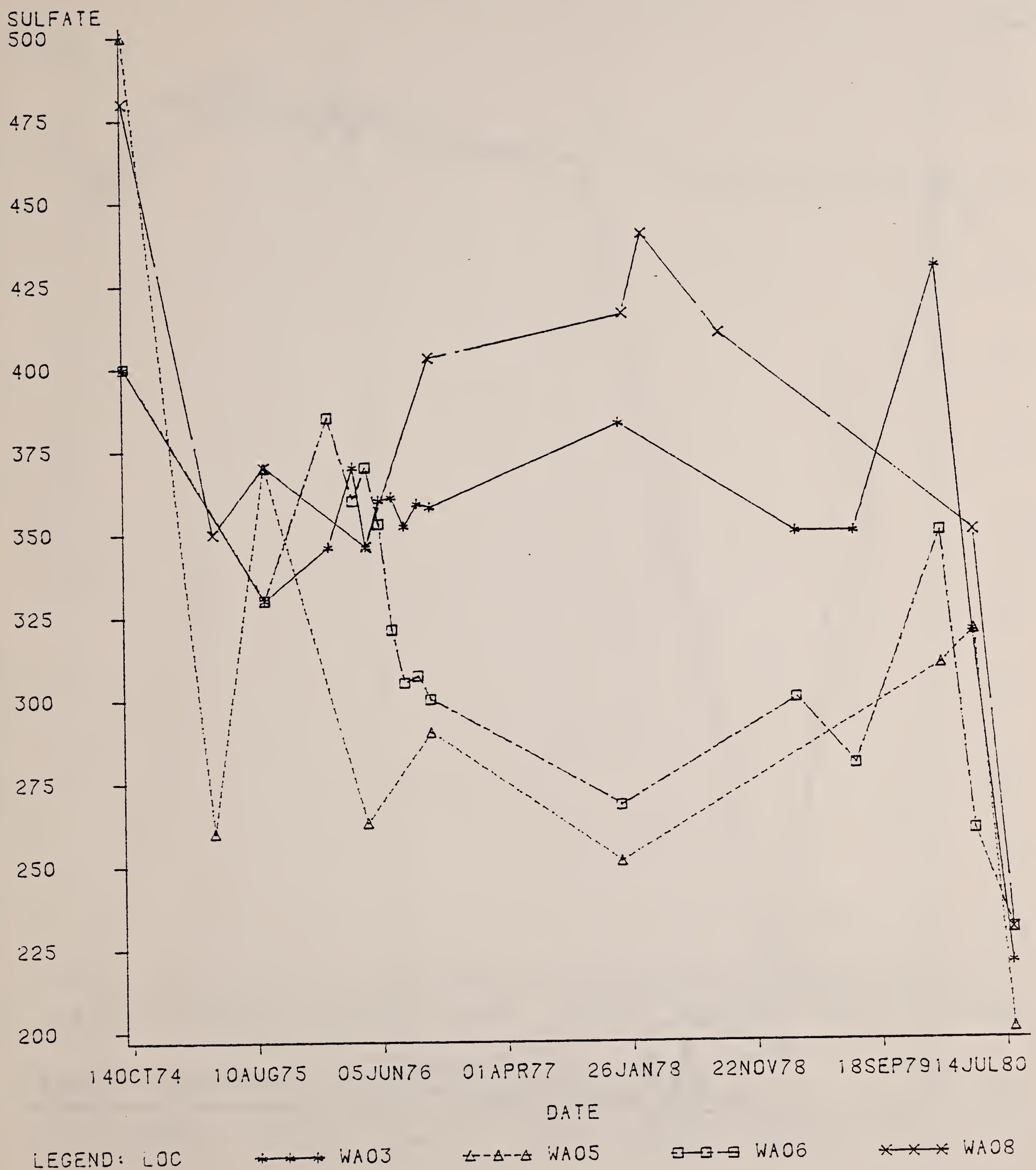


FIGURE A 5.3.3-5

ALLUVIAL WELL WATER QUALITY

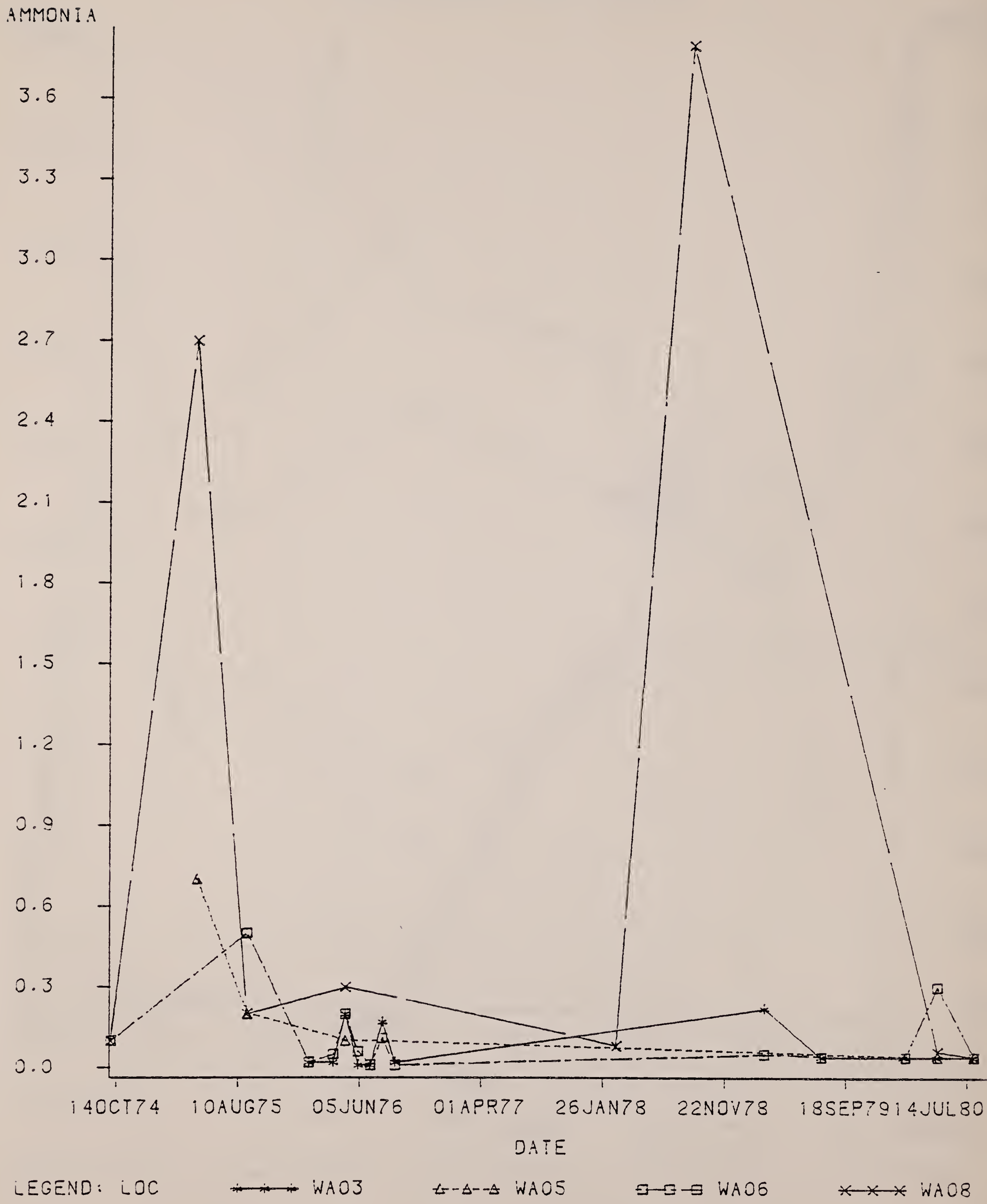


FIGURE A 5.3.3-6

ALLUVIAL WELL WATER QUALITY

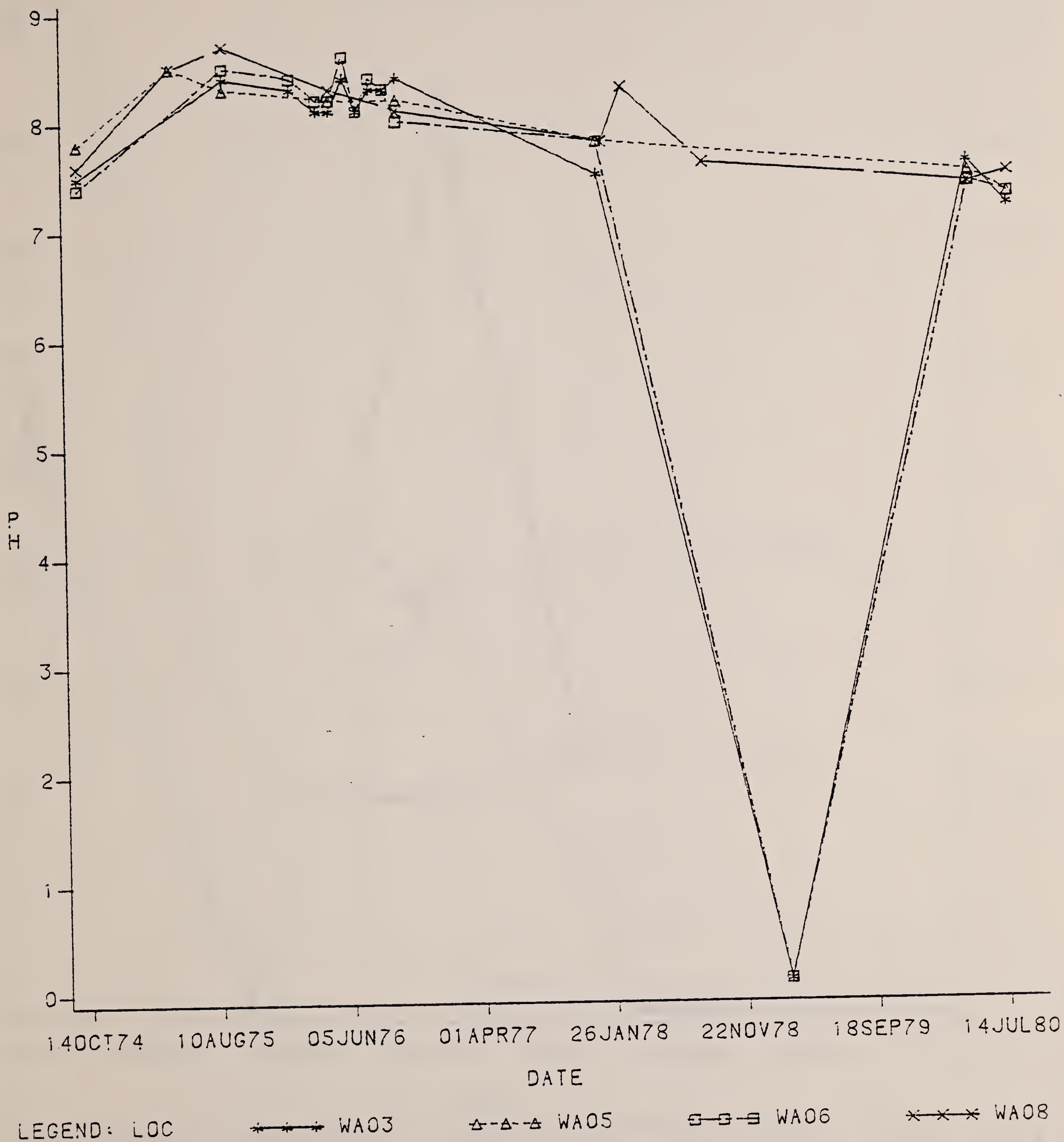


FIGURE A 5.3.3-7

ALLUVIAL WELL WATER QUALITY

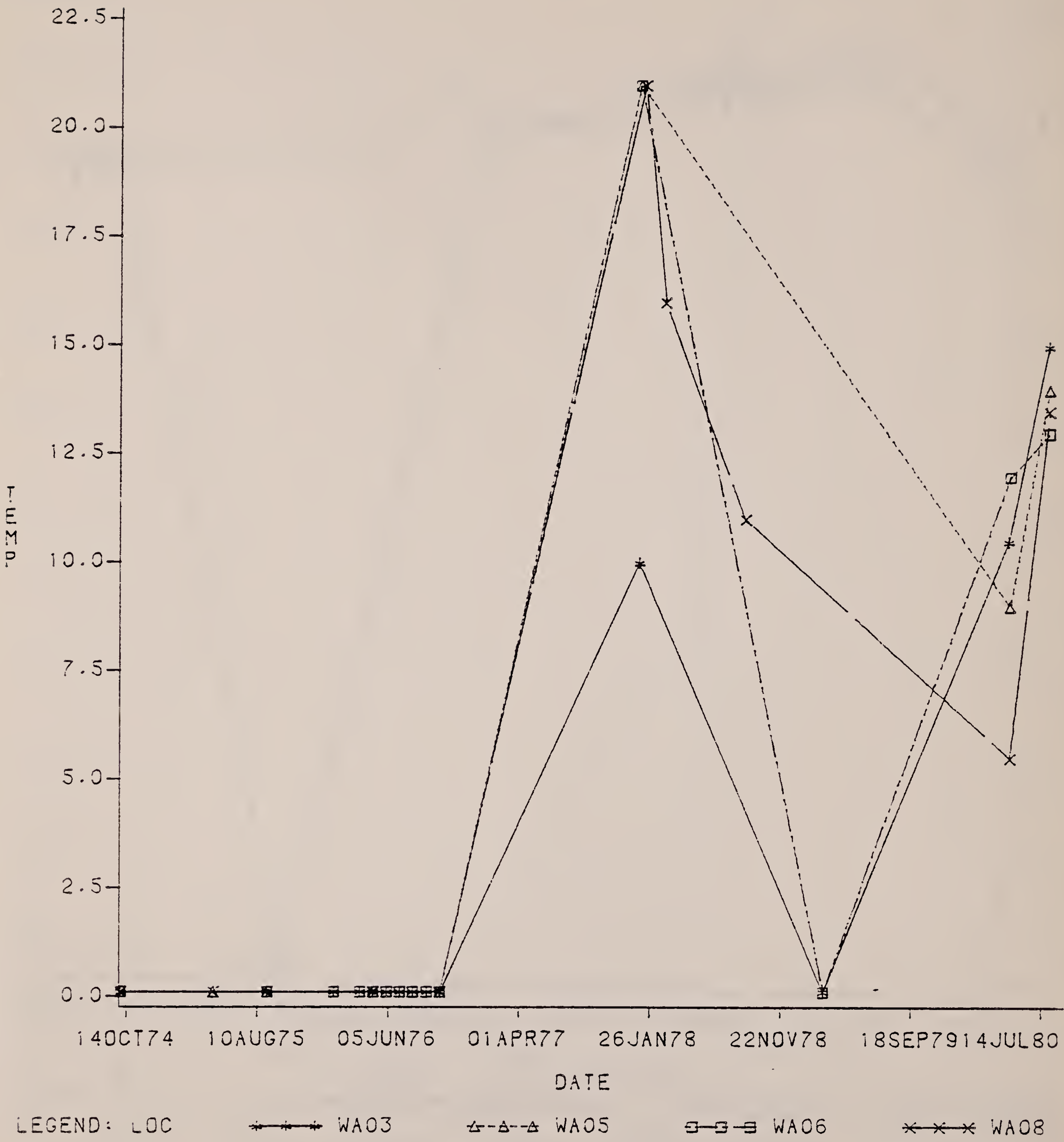


FIGURE A 5.3.3-8

ALLUVIAL WELL WATER QUALITY

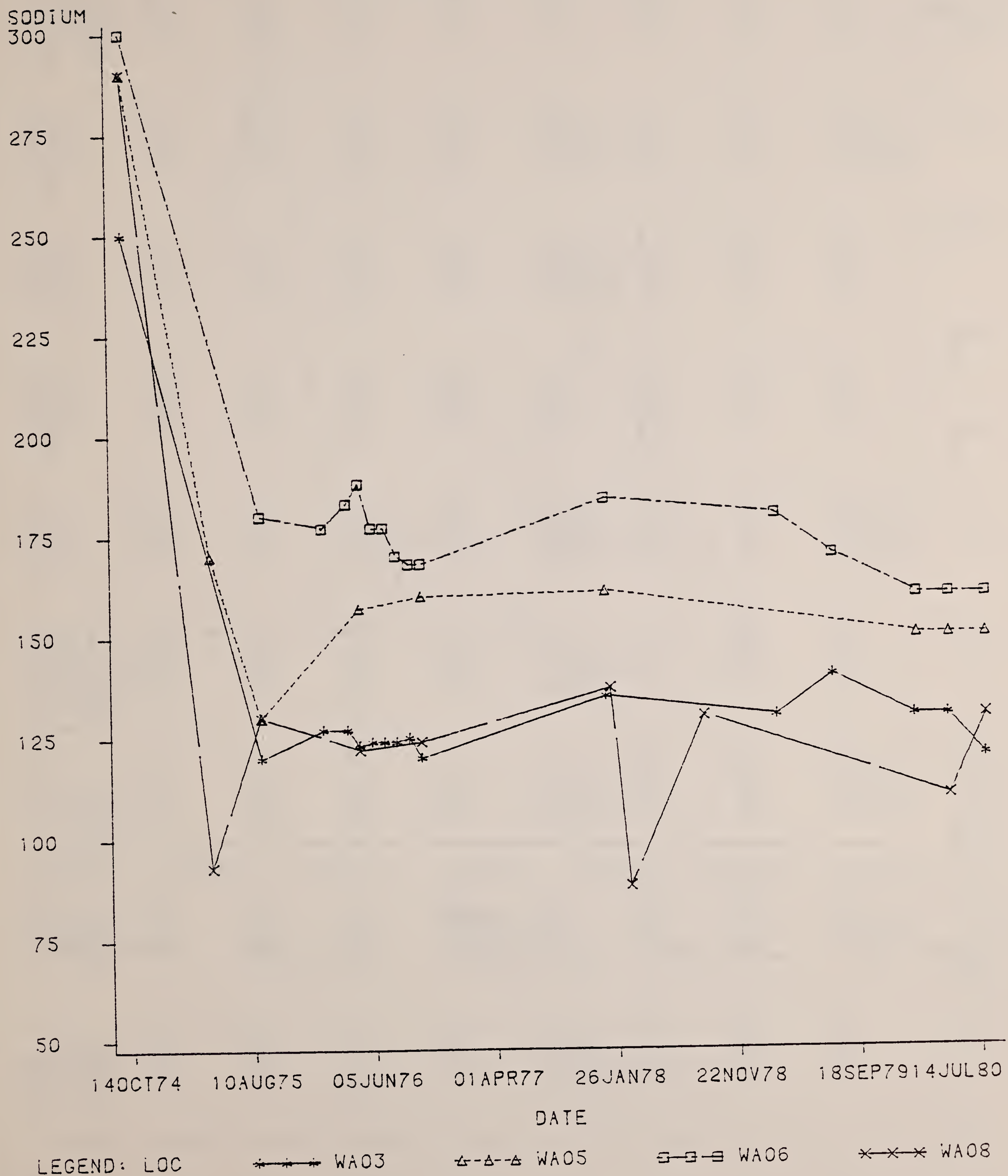
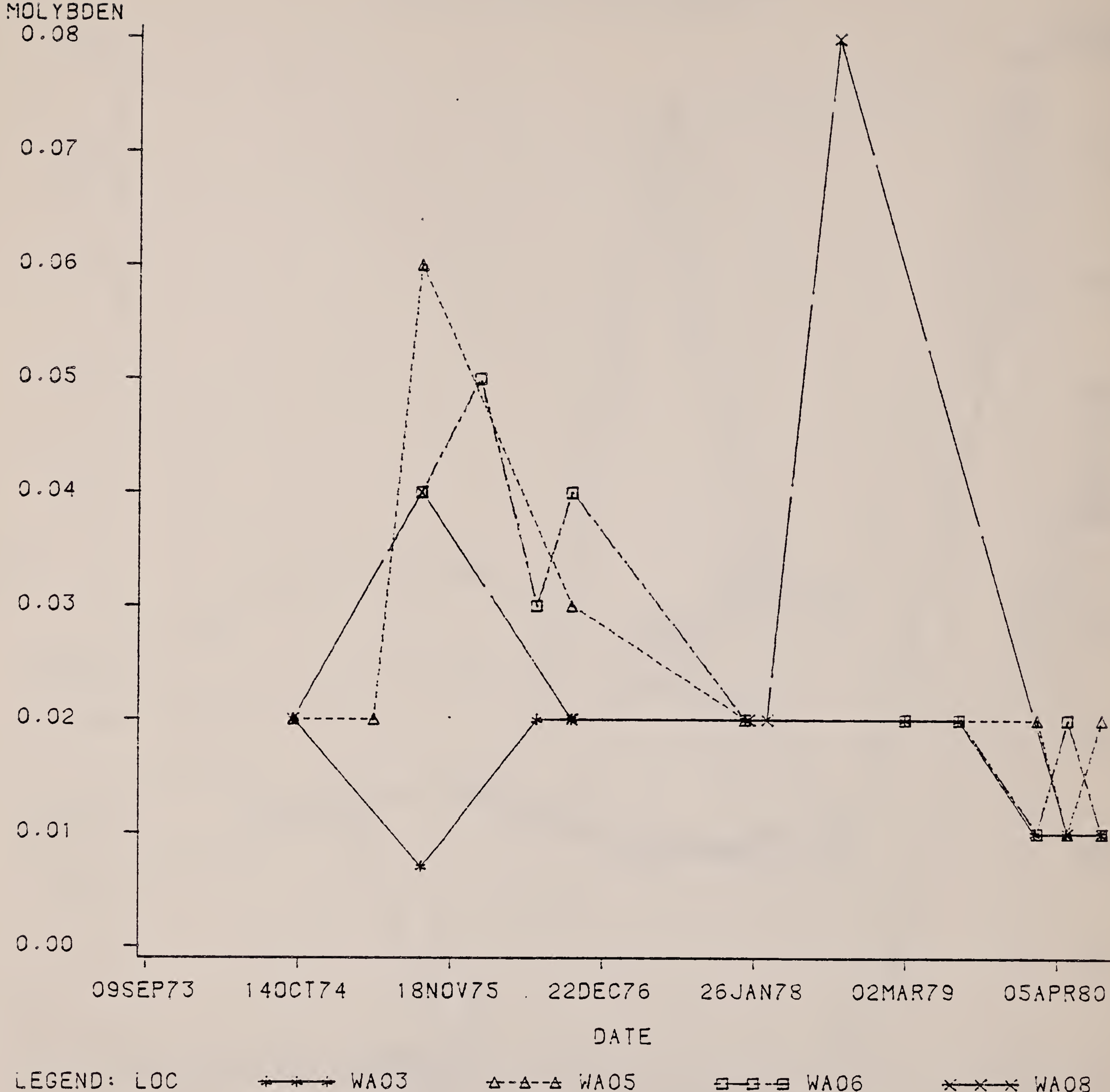


FIGURE A 5.3.3-9

ALLUVIAL WELL WATER QUALITY



LONG TERM TIME TREND ANALYSIS FOR ALLUVIAL WELLS

Dependent Variable		WA01	WA02	WA03 *	WA05	WA06	WA07	WA08	WA09	WA10
DEPTH (ft)	1.	6236.4363/55	6270.6534/36	6370.1981/60	6326.0875/56	6327.4969/59	6349.7955/50	6384.1105/52	6492.8929/55	6562.7931/45
	2.	0.0060	0.0080	0.0479	0.0003	0.1371	0.4729	0.4630	0.1155	0.0003
	3.	0.0014	0.0012	-0.0013	0.0007					-0.0036
	4.	6227.3031	6263.0167	6378.7730	6321.4807					6585.0653
	5.	0.1337	0.1894	0.0658	0.2180					0.2686
pH	1.	7.4492/13	7.5260/10	7.4871/14	7.5864/11	7.6823/13	7.8000/7	7.7130/10	7.6333/3	7.6333/3
	2.	0.4955	0.6033	0.2427	0.1010	0.5653	0.3739	0.9773	0.9962	0.3671
	3.									
	4.									
	5.									
TEMP (°C)	1.	12.0071/14	11.6000/10	10.3714/14	11.2909/11	11.3429/14	12.0000/7	10.1818/11	9.9847/14	12.1667/3
	2.	0.6582	0.3644	0.7006	0.8335	0.2315	0.3768	0.4064	0.5710	0.2391
	3.									
	4.									
	5.									
SPC (μmhos)	1.	1478.1647/17	1115.1429/7	1254.9214/14	1290.1250/8	1325.5643/14	1169.6923/13	1091.5900/10	869.3455/11	1150.6125/8
	2.	0.1272	0.6702	0.0856	0.0728	0.0299	0.3479	0.3167	0.2803	0.3853
	3.					-0.3764				
	4.					3683.2724				
	5.					0.3357				
DOC (mg/l)	1.	3.5600/15	1.6667/6	1.9417/12	2.0571/7	2.5250/12	4.0444/9	3.4778/9	6.9250/8	6.9250/8
	2.	0.4972	0.0069	0.4024	0.8675	0.3680	0.8100	0.6794	0.5415	0.1086
	3.		0.0042							
	4.		-23.8691							
	5.		0.8678							
AS (mg/l)	1.	-0.0059/17	-0.0120/8	-0.0012/14	0.0027/9	-0.0008/15	0.0019/13	-0.0046/10	-0.0070/12	-0.0006/8
	2.	0.0002	0.0954	0.0103	0.0157	0.0088	-0.3507	0.0336	0.0074	0.3019
	3.	-0.00002		-0.00002	-0.00002	-0.00002		-0.00001	-0.0001	
	4.	0.0915		0.1214	0.1363	0.1140		0.0777	0.0864	
	5.	0.6046		0.4348	0.5897	0.4249		0.4432	0.5288	
F (mg/l)	1.	0.9511/19	2.0222/9	0.4788/16	1.0778/9	0.5294/16	0.3093/14	0.2900/10	0.2592/12	0.3375/8
	2.	0.2111	0.1615	0.2017	0.2837	0.3510	0.2651	0.5404	0.0782	0.2812
	3.									
	4.									
	5.									
B (mg/l)	1.	0.2357/14	0.3001/8	0.1435/11	0.3163/8	0.2855/11	0.3122/9	0.1300/9	0.2673/11	0.2631/7
	2.	0.9510	0.1880	0.2743	0.0874	0.0804	0.0826	0.0540	0.2033	0.0707
	3.									
	4.									
	5.									
MOLY (mg/l)	1.	0.0243/14	0.0021/7	0.0017/10	0.0175/8	0.0180/10	0.0238/8	0.0125/8	0.0073/11	0.0035/6
	2.	0.1963	0.0441	0.0056	0.6603	0.0030	0.3297	0.8631	0.0206	0.7141
	3.		-0.00002	-0.00002		-0.00003			-0.00003	
	4.		0.1245	0.1226		0.2106			0.2017	
	5.		0.5888	0.6374		0.6877			0.4661	

NOTE: Entries in the table mean the following:

1. Mean/Number of paired observations
2. $\hat{\alpha}$ - to be compared with selected α. ($\alpha = 0.05$)
3. Slope - slope is units per month
4. Intercept
5. r^2 value

* There is no WA04

TABLE A5.3.3-1(Cont.)

LONG TERM TIME TREND ANALYSIS FOR ALLUVIAL WELLS

Dependent Variable		WA01	WA02	WA03	* WA05	WA06	WA07	WA08	WA09	WA10
NA (mg/l)	1.	243.3158/19	154.0000.9	134.3125/16	168.6667/9	181.3750/16	153.7143/14	135.4000/10	113.0000/12	136.5000/8
	2.	0.5079	0.1185	0.2347	0.1946	0.0305	0.1060	0.2370	0.5851	0.4110
	3.					-0.0264				
	4.					349.9536				
						0.2924				
SO_4 (mg/l)	1.	399.3105/19	264.4444/9	352.1875/16	307.1111/9	319.9375/16	284.6429/14	379.5000/10	320.1667/12	399.2500/8
	2.	0.3298	0.9388	0.2091	0.1749	0.0019	0.0092	0.1470	0.9150	0.0088
	3.					-0.0505	-0.0864			-0.0624
	4.					642.2962	814.9380			780.1103
	5.					0.5085	0.4450			0.7082
NH_3 (mg/l)	1.	1.4694/16	0.4356/9	0.0342/12	0.1600/6	0.0793/14	0.4975/12	0.9000/8	0.3710/10	0.3920/5
	2.	0.6450	0.1272	0.3952	0.0852	0.4775	0.3698	0.8349	0.1363	0.6077
	3.									
	4.									
	5.									

Dependent Variable		WA11	WA12
DEPTH (ft)	1.	6448.9562/51	6637.0273/55
	2.	0.0314	0.0397
	3.	-0.0006	-0.0008
	4.	6452.7540	6642.0086
	5.	0.0911	0.0774
pH	1.	7.8600/5	7.5973/11
	2.	0.1658	0.0144
	3.		-0.0006
	4.		11.9395
	5.		0.5038
TEMP (°C)	1.	9.5000/7	10.8083/12
	2.	0.3452	0.2017
	3.		
	4.		
	5.		
SPC (µmhos)	1.	1058.0889/9	1154.3455/11
	2.	0.0689	0.2587
	3.		
	4.		
	5.		

Dependent Variable		WA11	WA12
DOC (mg/l)	1.	6.4250/8	5.8222/9
	2.	0.1657	0.3623
	3.		
	4.		
	5.		
AS (mg/l)	1.	-0.0023/9	-0.0052/11
	2.	0.0855	0.0113
	3.		-0.00002
	4.		781.8514
	5.		0.4727
F (mg/l)	1.	0.2344/9	0.3836/11
	2.	0.1566	0.0954
	3.		
	4.		
	5.		
B (mg/l)	1.	0.2813/8	0.6810/10
	2.	0.1264	0.1018
	3.		
	4.		
	5.		

Dependent Variable		WA11	WA12
MOLY (mg/l)	1.	0.2333/6	0.2222/9
	2.	0.3529	0.0502
	3.		
	4.		
	5.		
NA (mg/l)	1.	143.4444/9	196.7273/11
	2.	0.0969	0.1308
	3.		
	4.		
	5.		
SO_4 (mg/l)	1.	428.3333/9	447.0000/11
	2.	0.1582	0.0914
	3.		-0.0521
	4.		781.8514
	5.		0.4727
NH_3 (mg/l)	1.	0.9283/6	0.1776/8
	2.	0.4566	0.0942
	3.		
	4.		
	5.		

NOTE: Entries in the table mean the following:
1. Mean/Number of paired observations
2. $\hat{\alpha}$ - to be compared with selected α. ($\alpha = 0.05$)
3. Slope - slope is units per month
4. Intercept
5. r^2 value

* There is no WA04

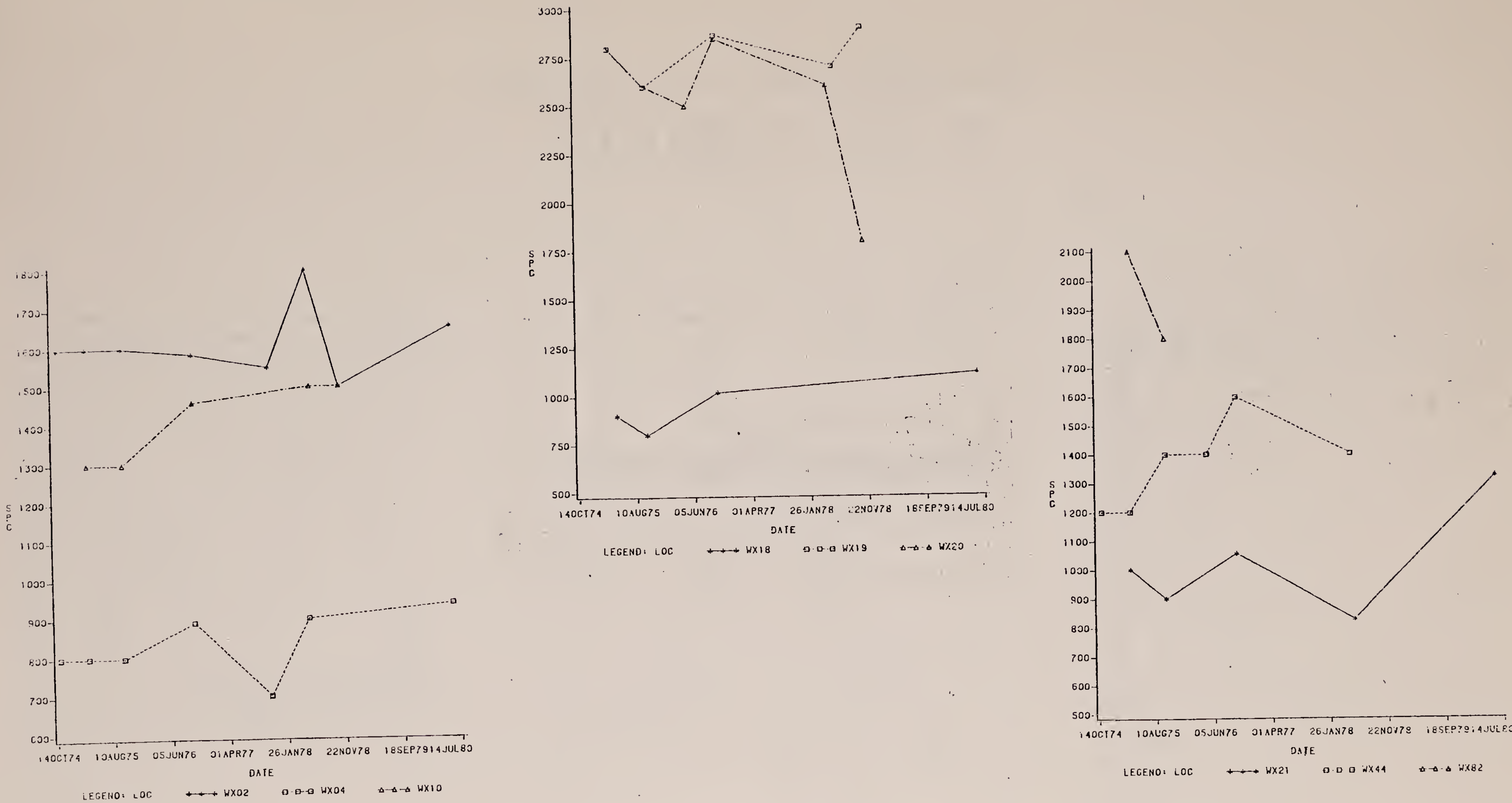
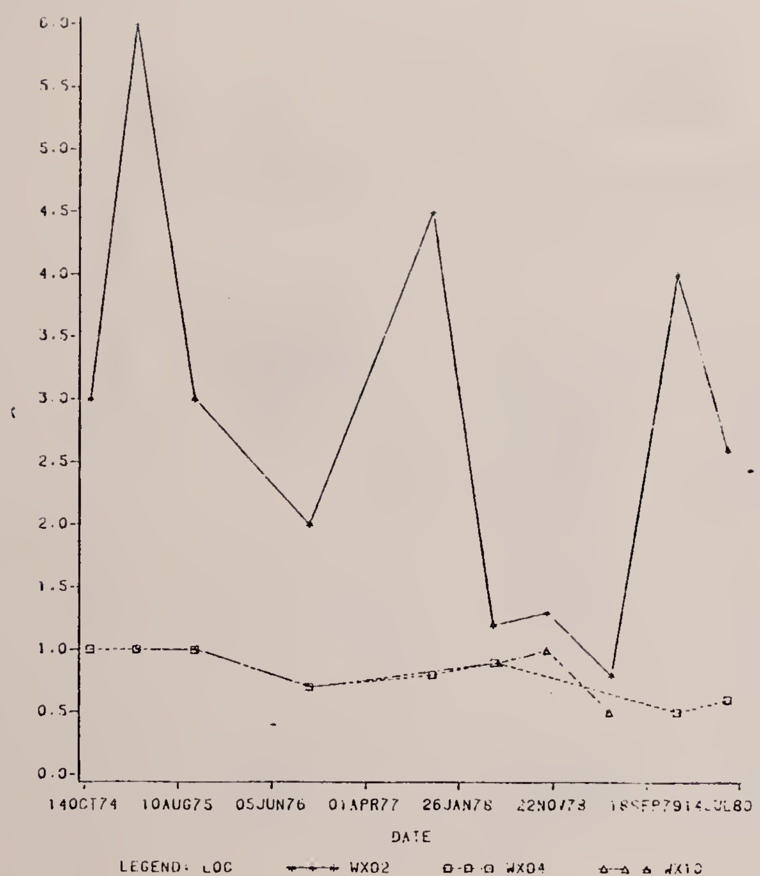
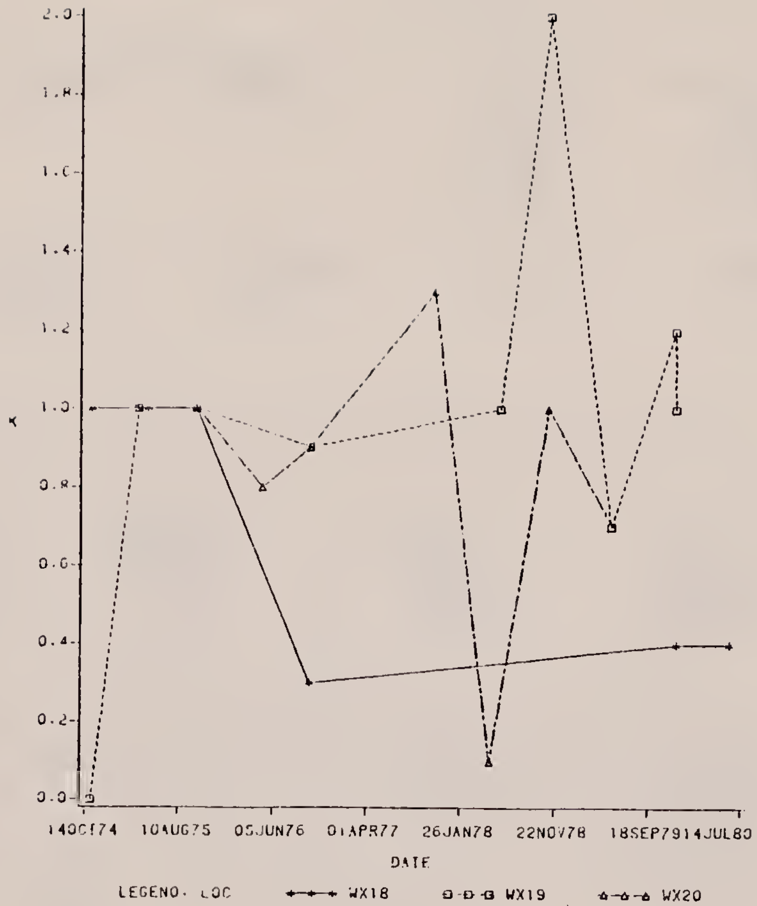


FIGURE A 5.3.4–1

WATER QUALITY FOR UPPER AQUIFER WELLS





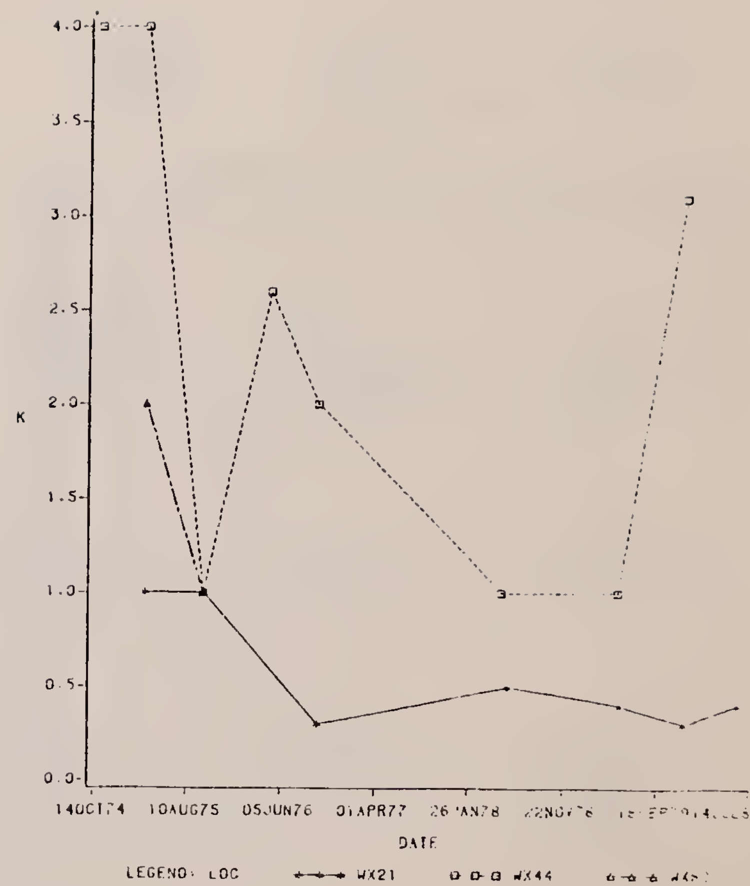


FIGURE A 5.3.4–2

WATER QUALITY FOR UPPER AQUIFER WELLS

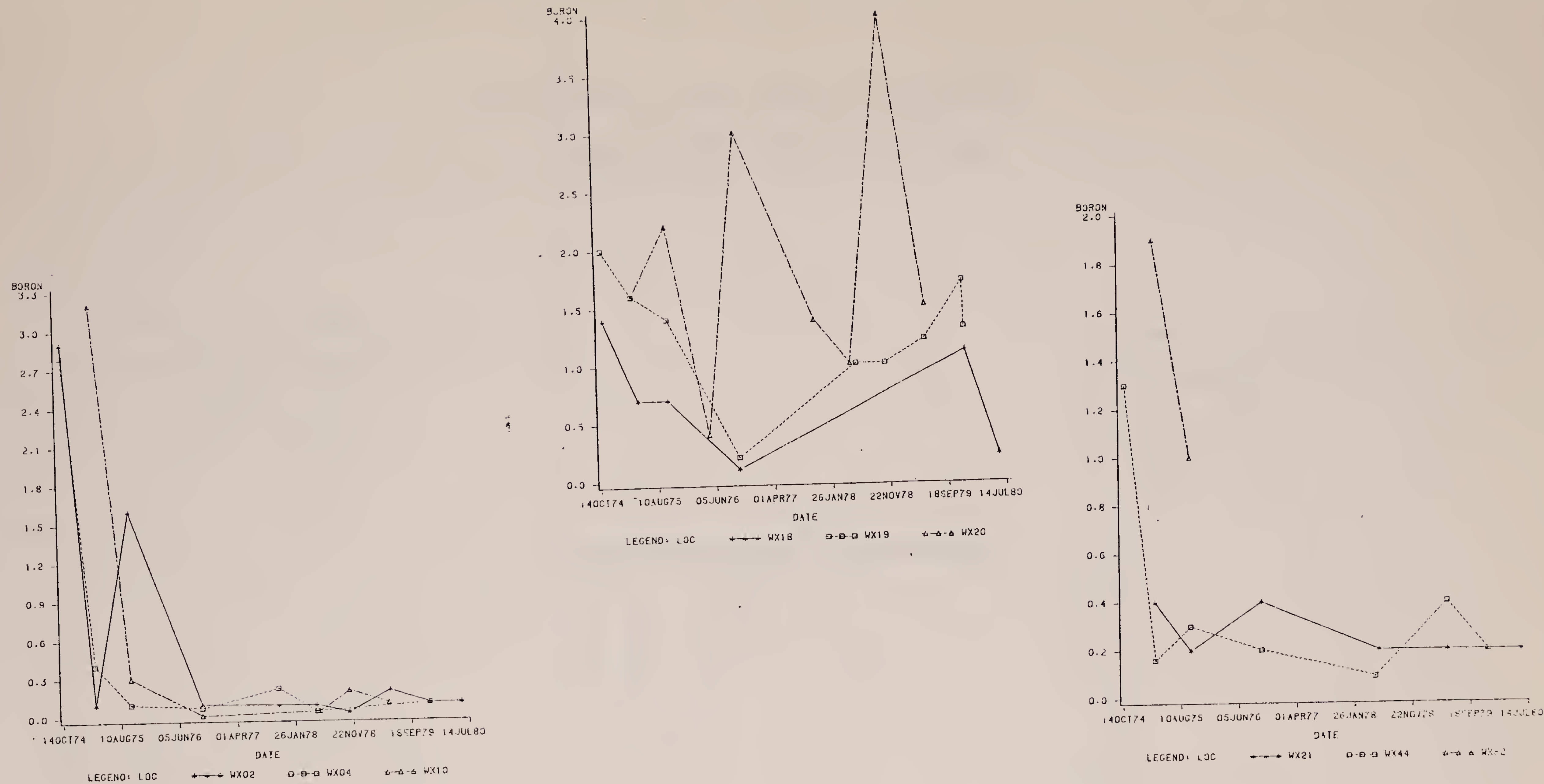


FIGURE A 5.3.4-3

WATER QUALITY FOR UPPER AQUIFER WELLS

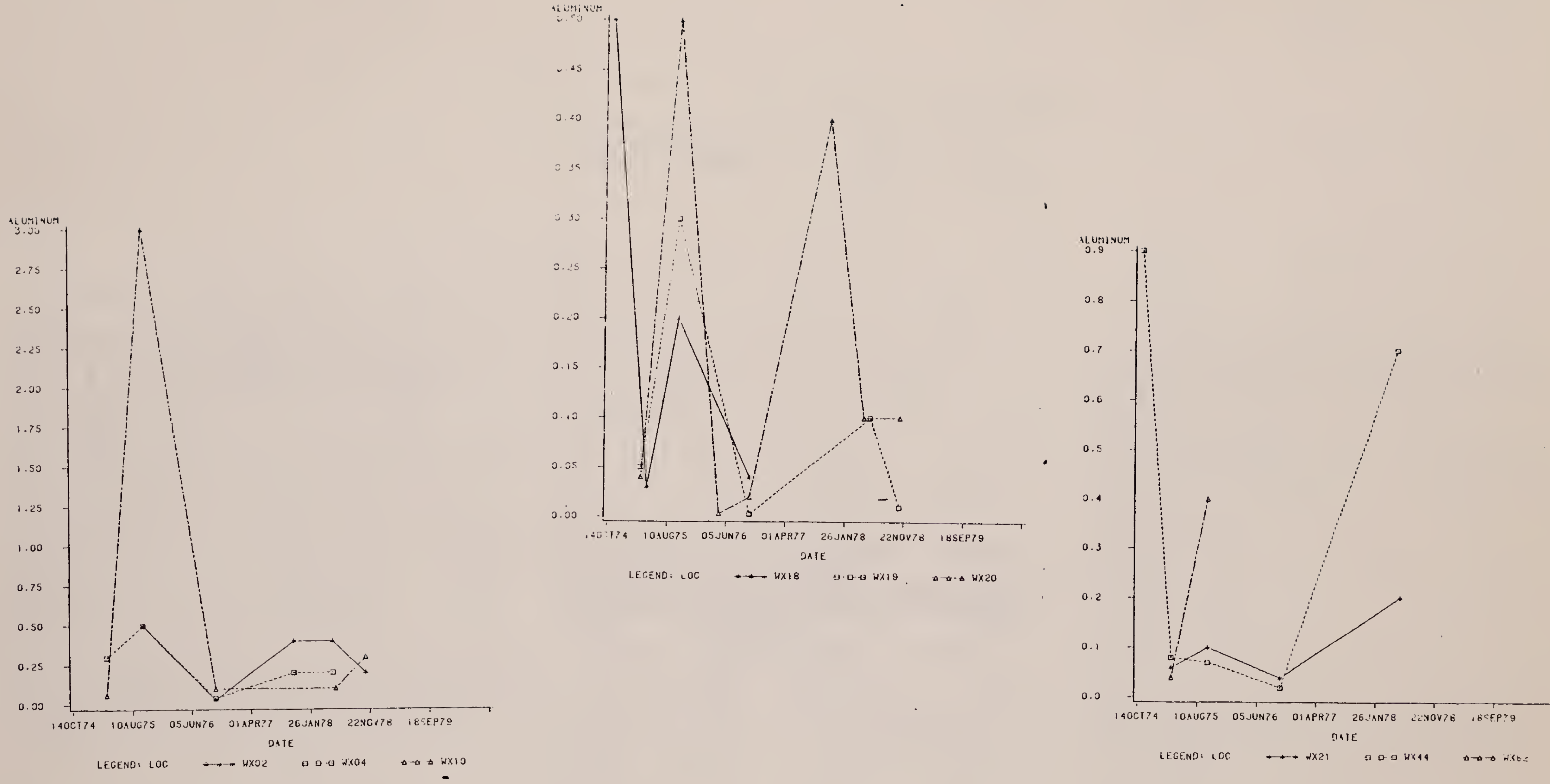


FIGURE A 5.3.4-4

WATER QUALITY FOR UPPER AQUIFER WELLS

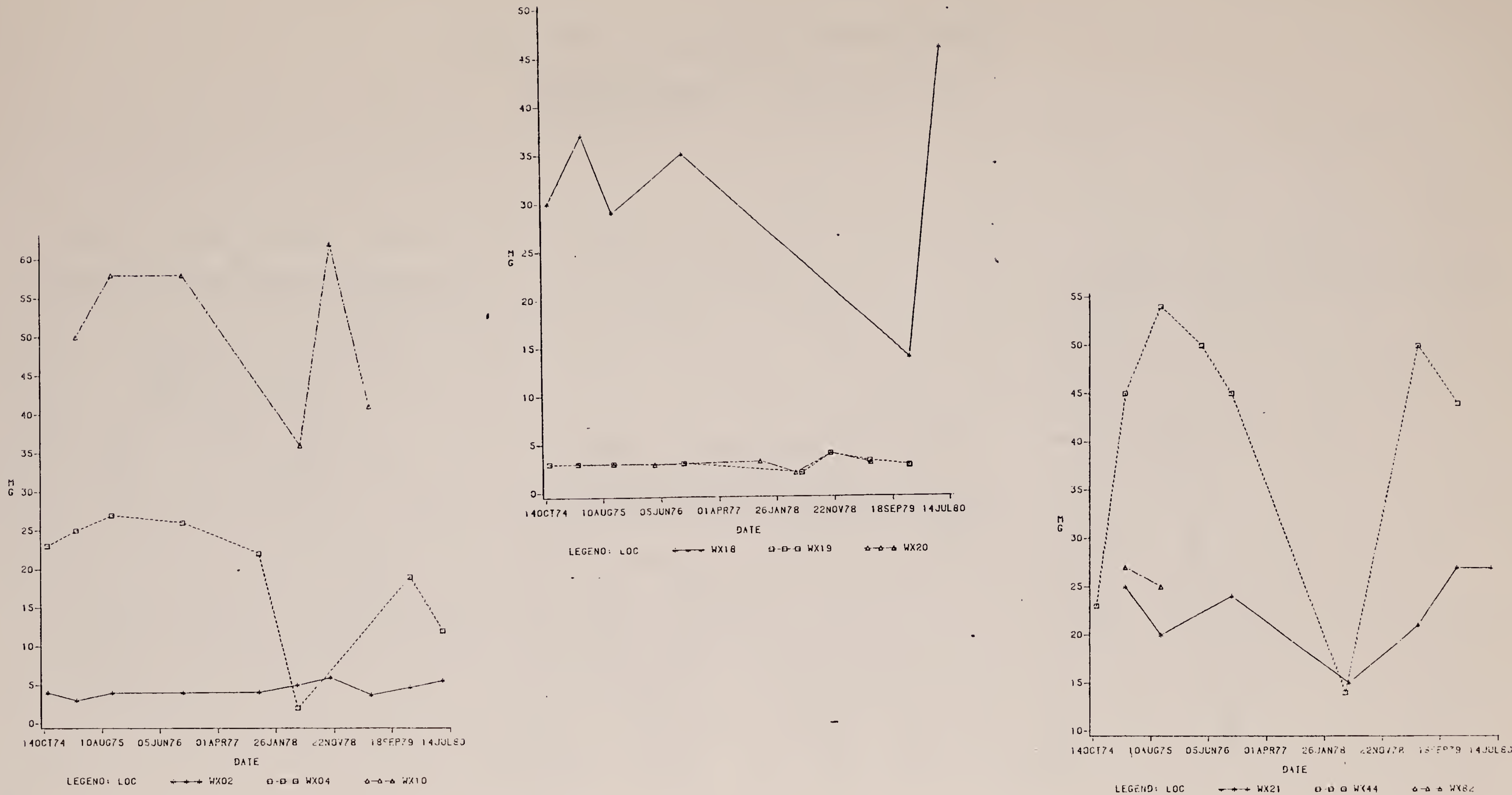


FIGURE A 5.3.4–5

WATER QUALITY FOR UPPER AQUIFER WELLS

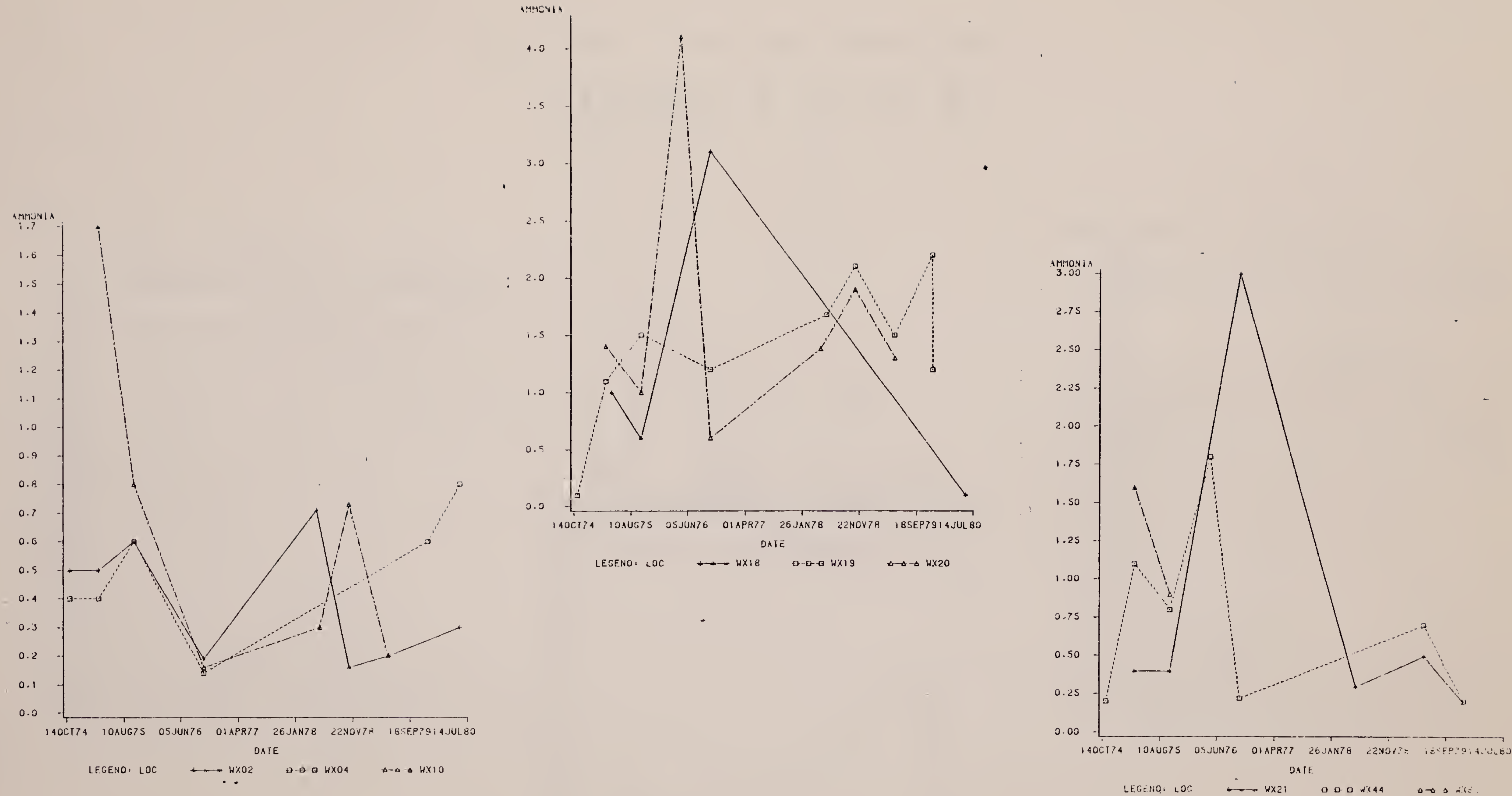


FIGURE A 5.3.4–6

WATER QUALITY FOR UPPER AQUIFER WELLS

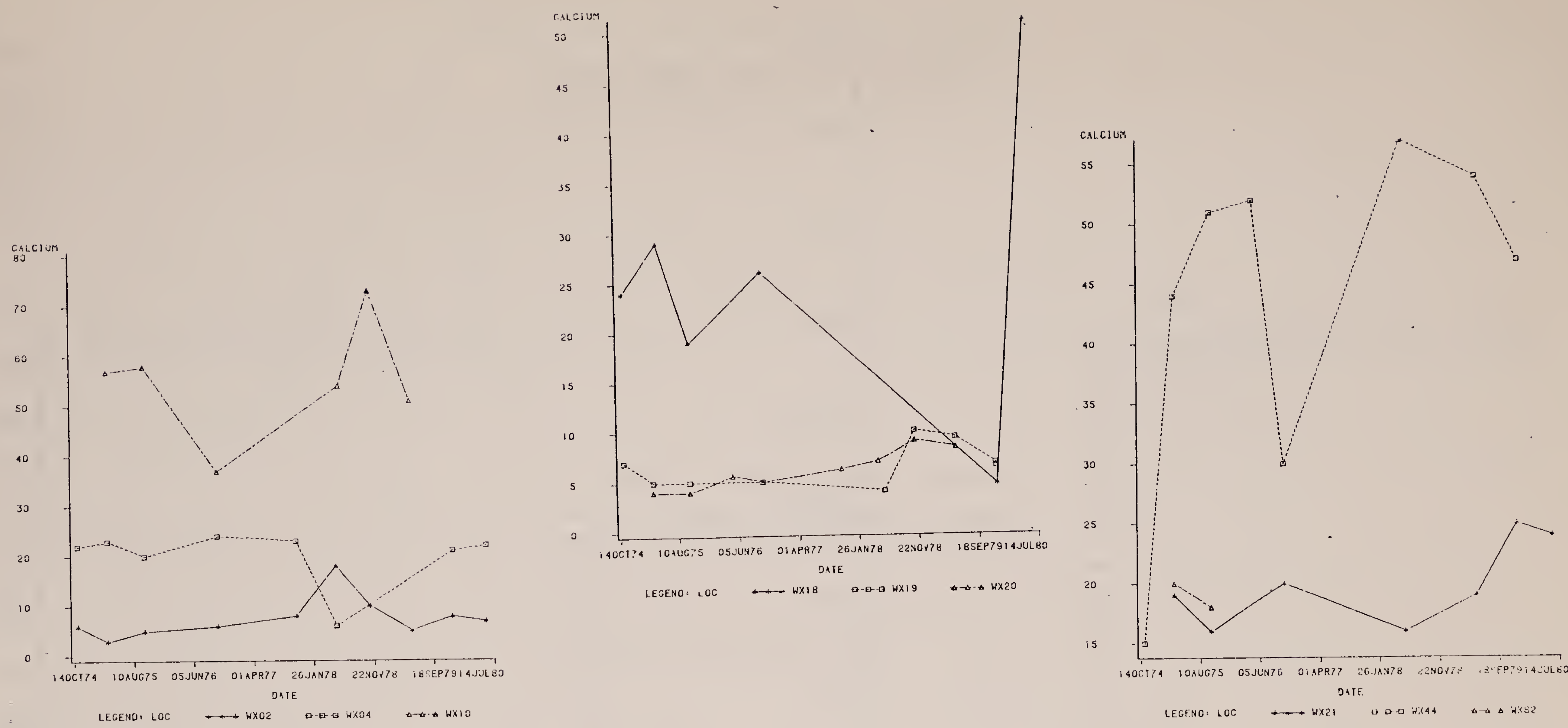


FIGURE A 5.3.4-7

WATER QUALITY FOR UPPER AQUIFER WELLS

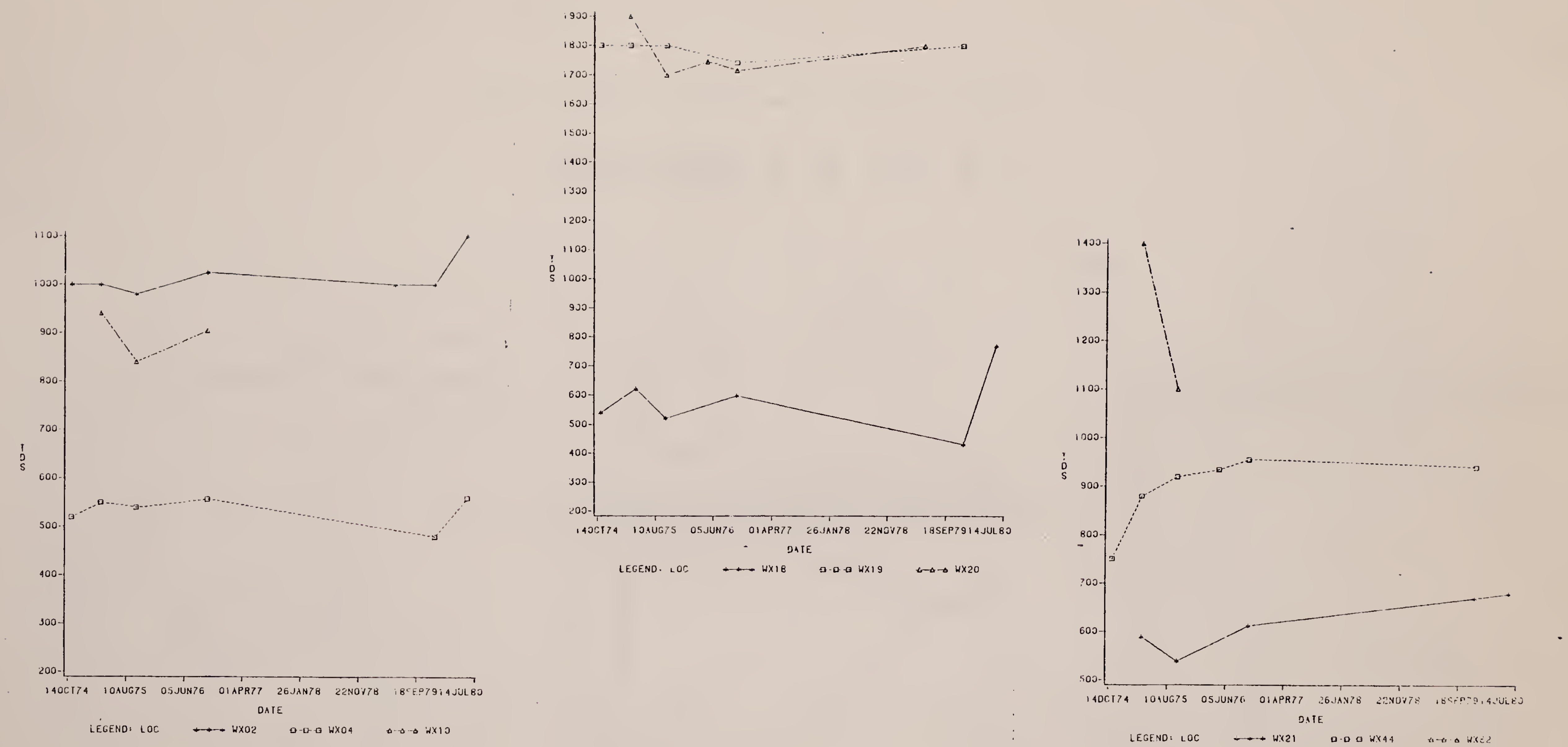


FIGURE A 5.3.4-8

WATER QUALITY FOR UPPER AQUIFER WELLS

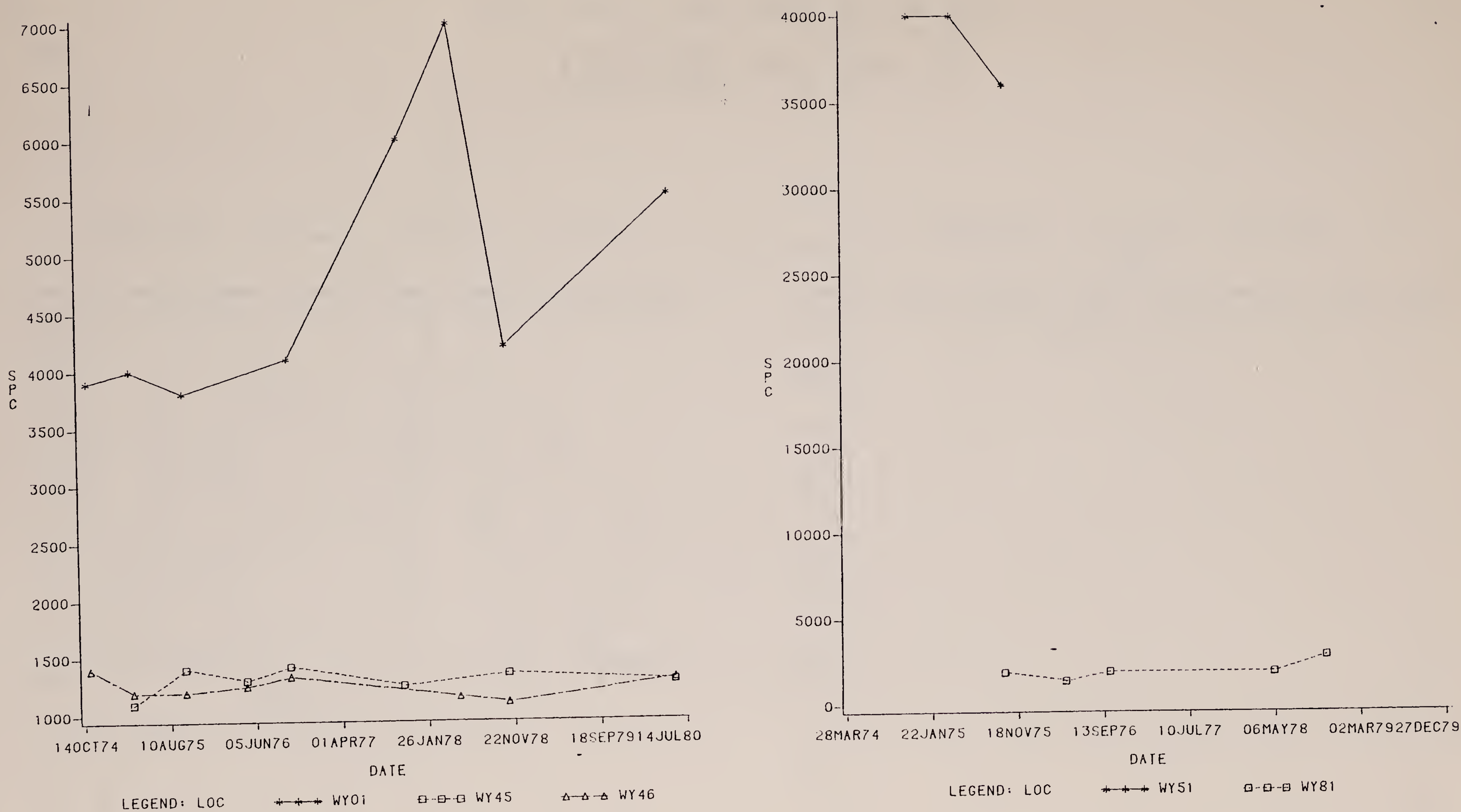
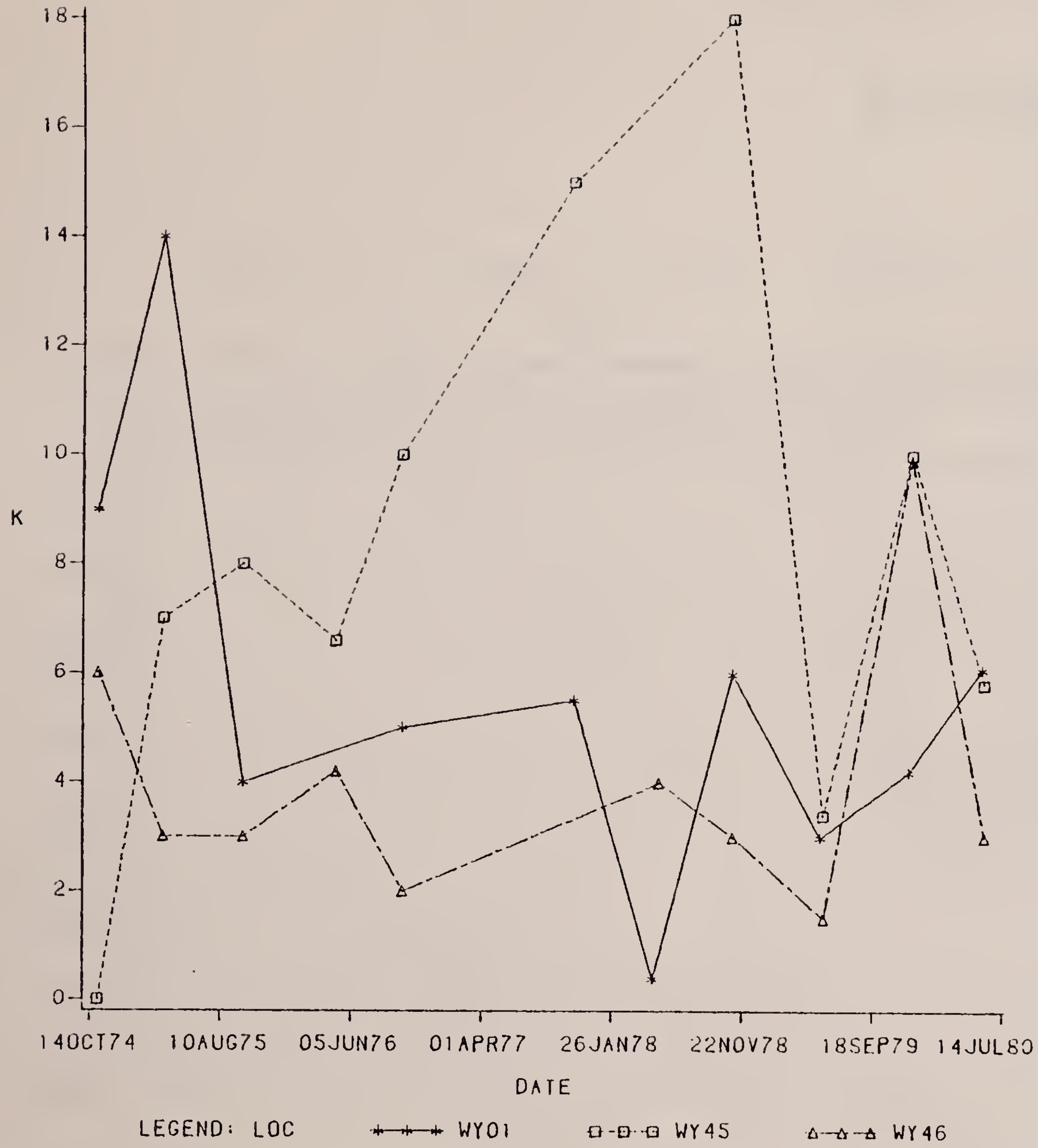


FIGURE A 5.3.5-1

WATER QUALITY FOR LOWER AQUIFER WELLS



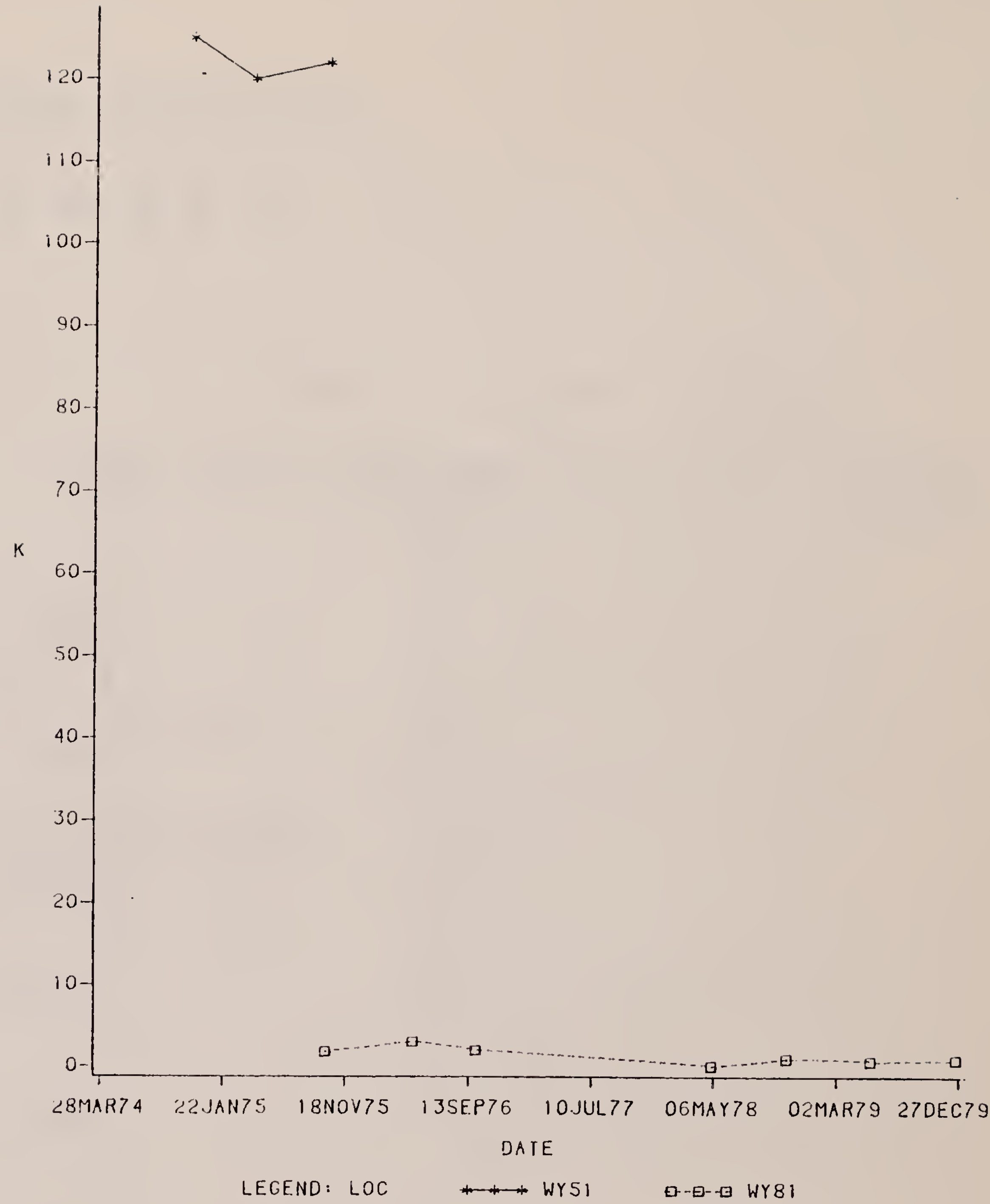
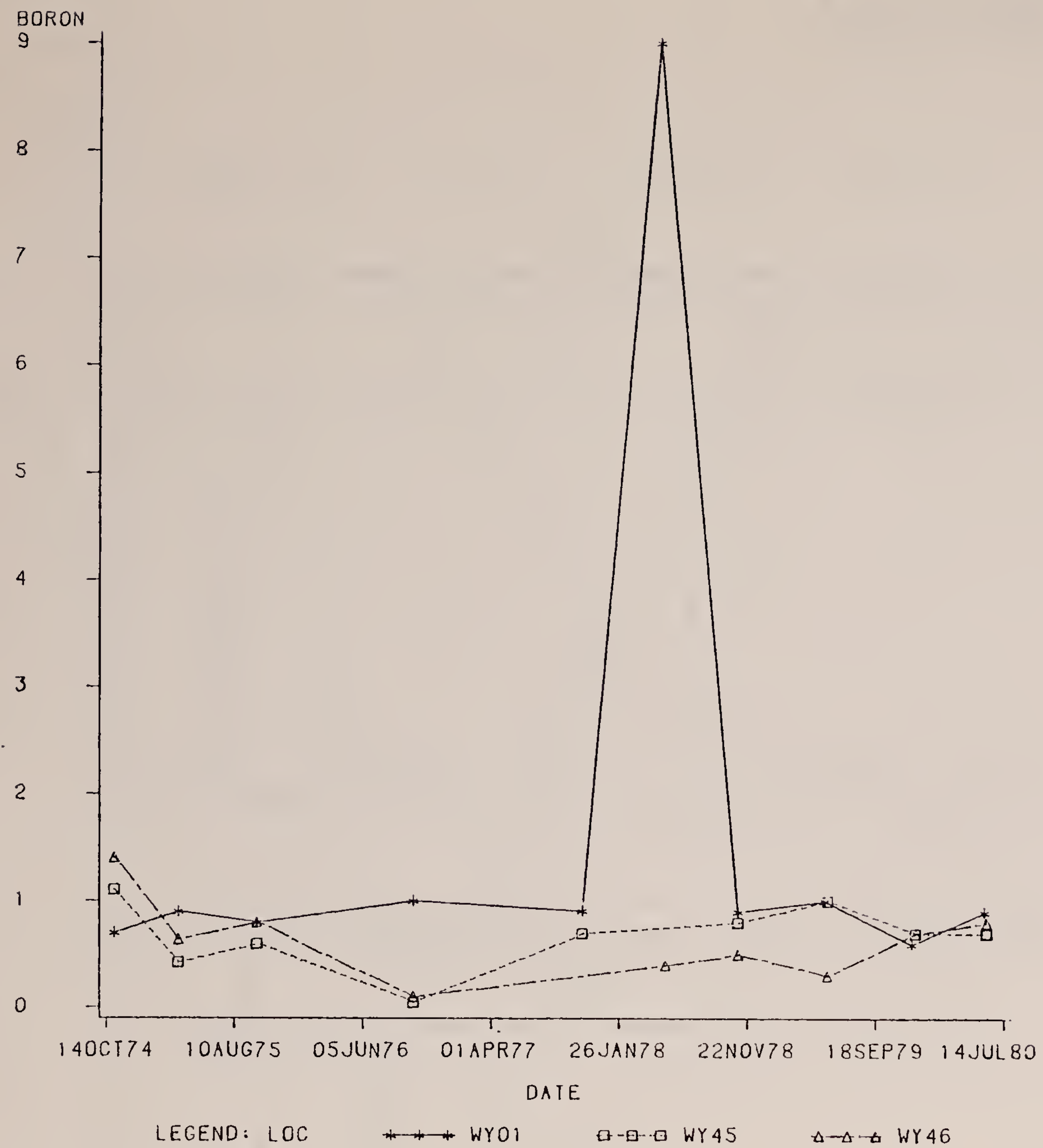


FIGURE A 5.3.5-2

WATER QUALITY FOR LOWER AQUIFER WELLS



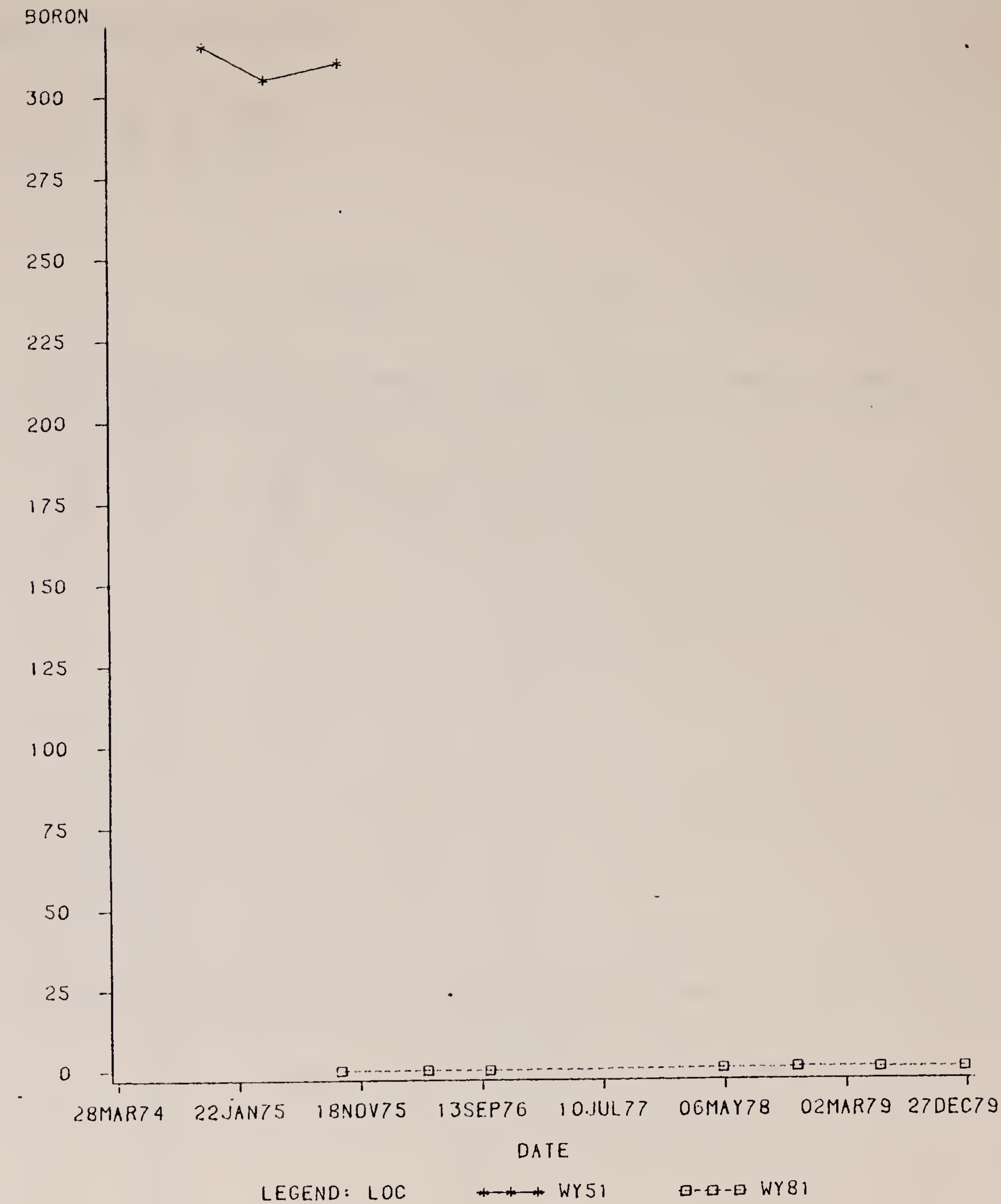


FIGURE A 5.3.5-3

WATER QUALITY FOR LOWER AQUIFER WELLS

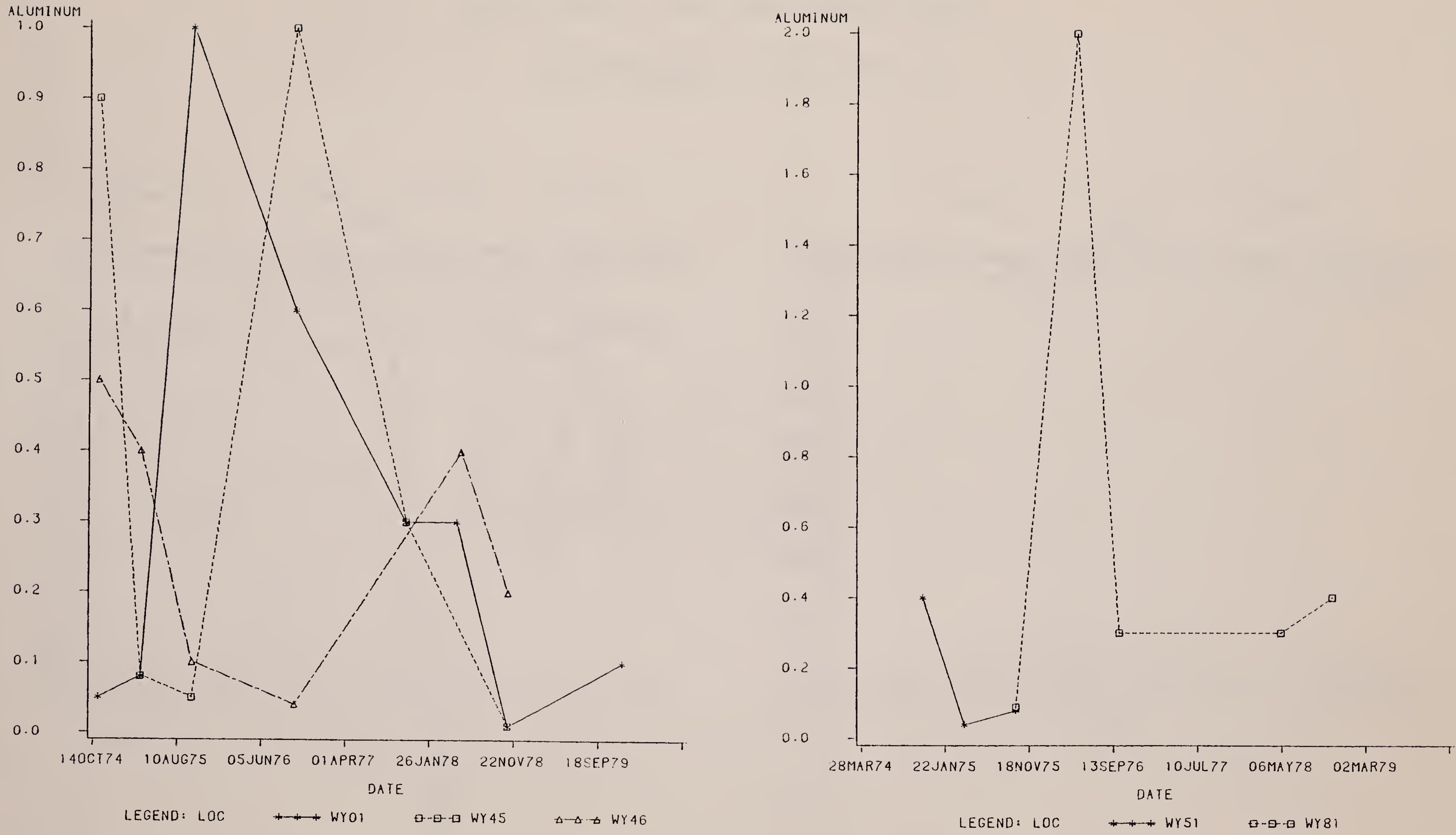


FIGURE A 5.3.5–4

WATER QUALITY FOR LOWER AQUIFER WELLS

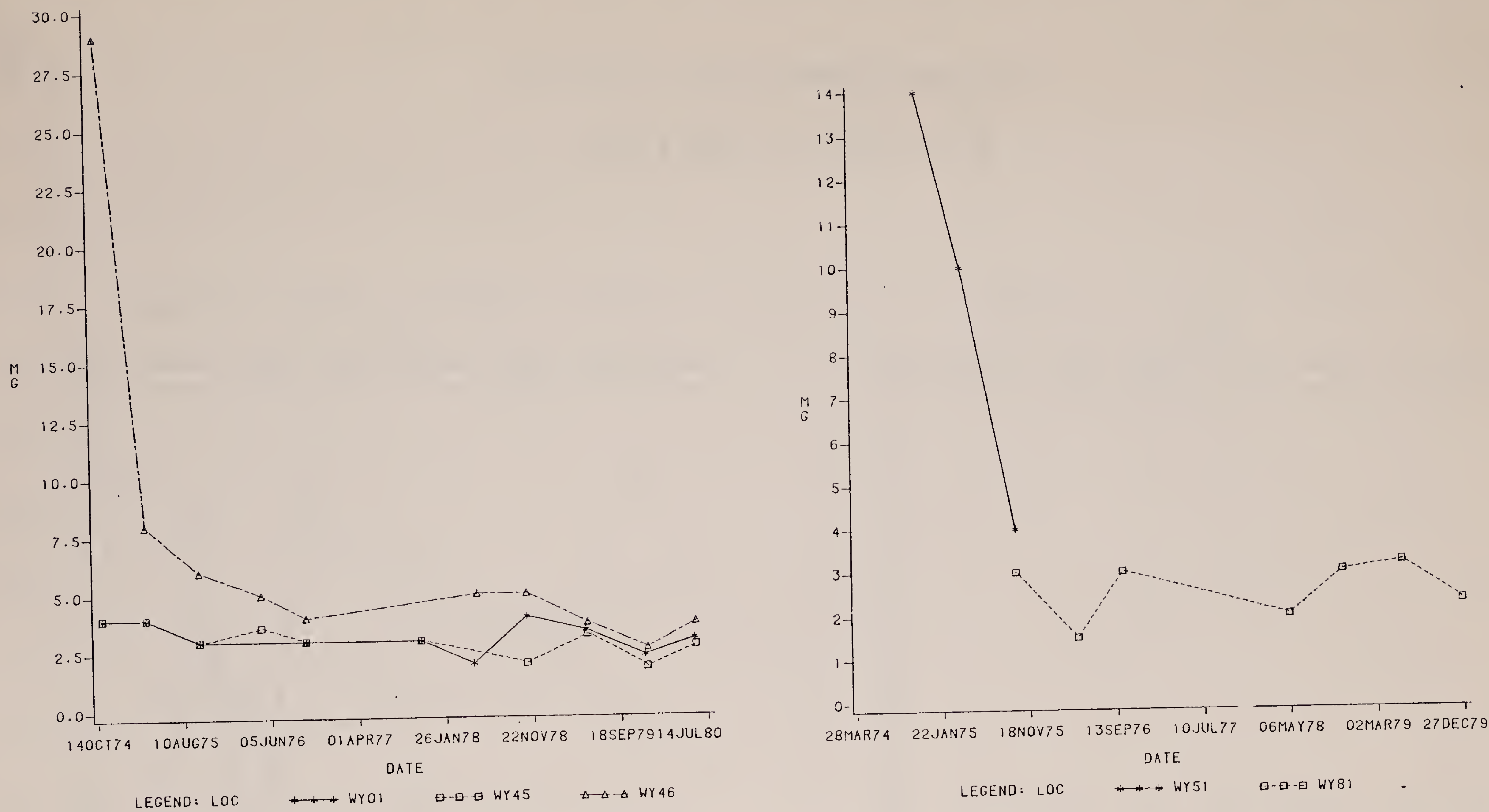
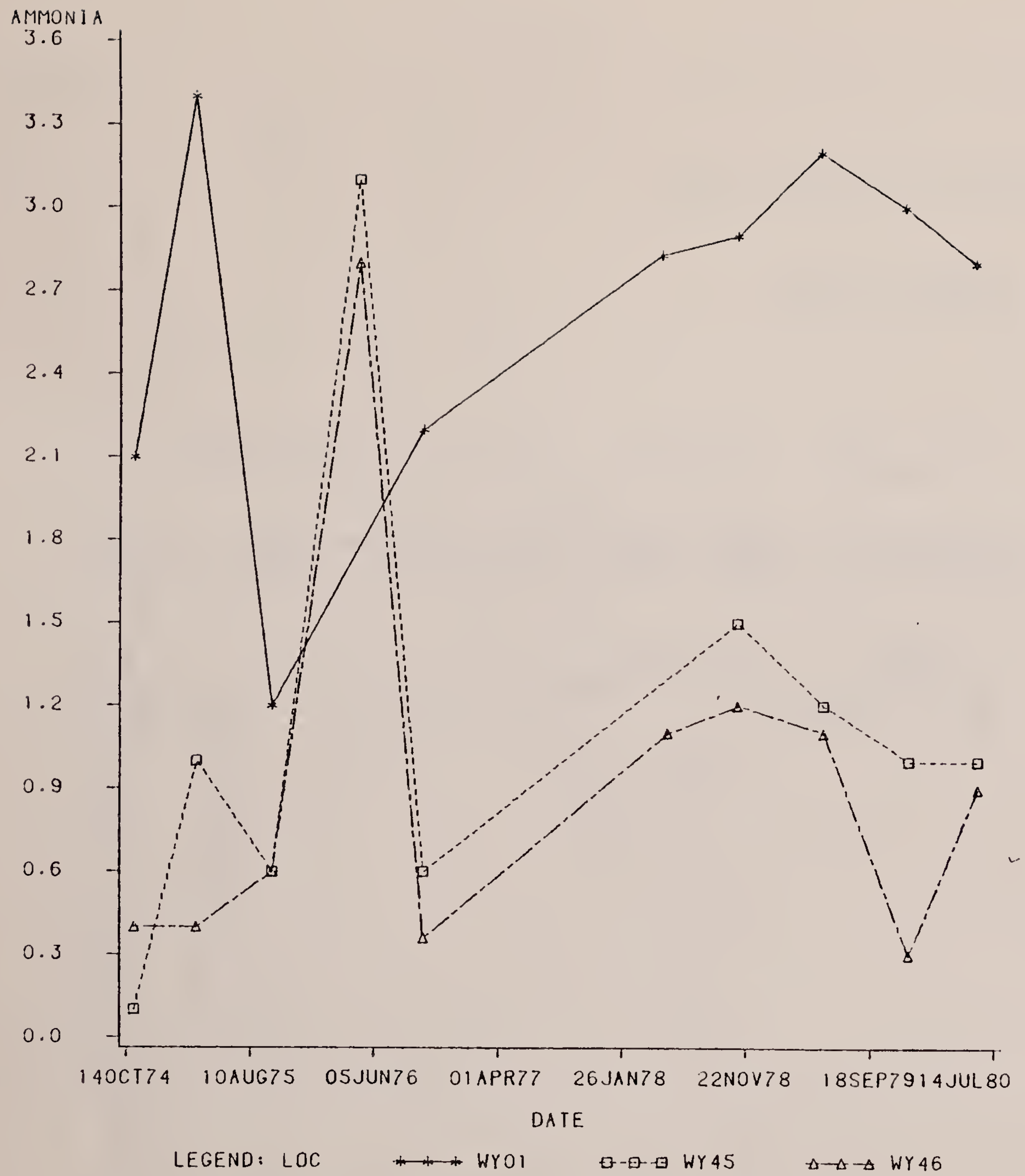


FIGURE A 5.3.5–5

WATER QUALITY FOR LOWER AQUIFER WELLS



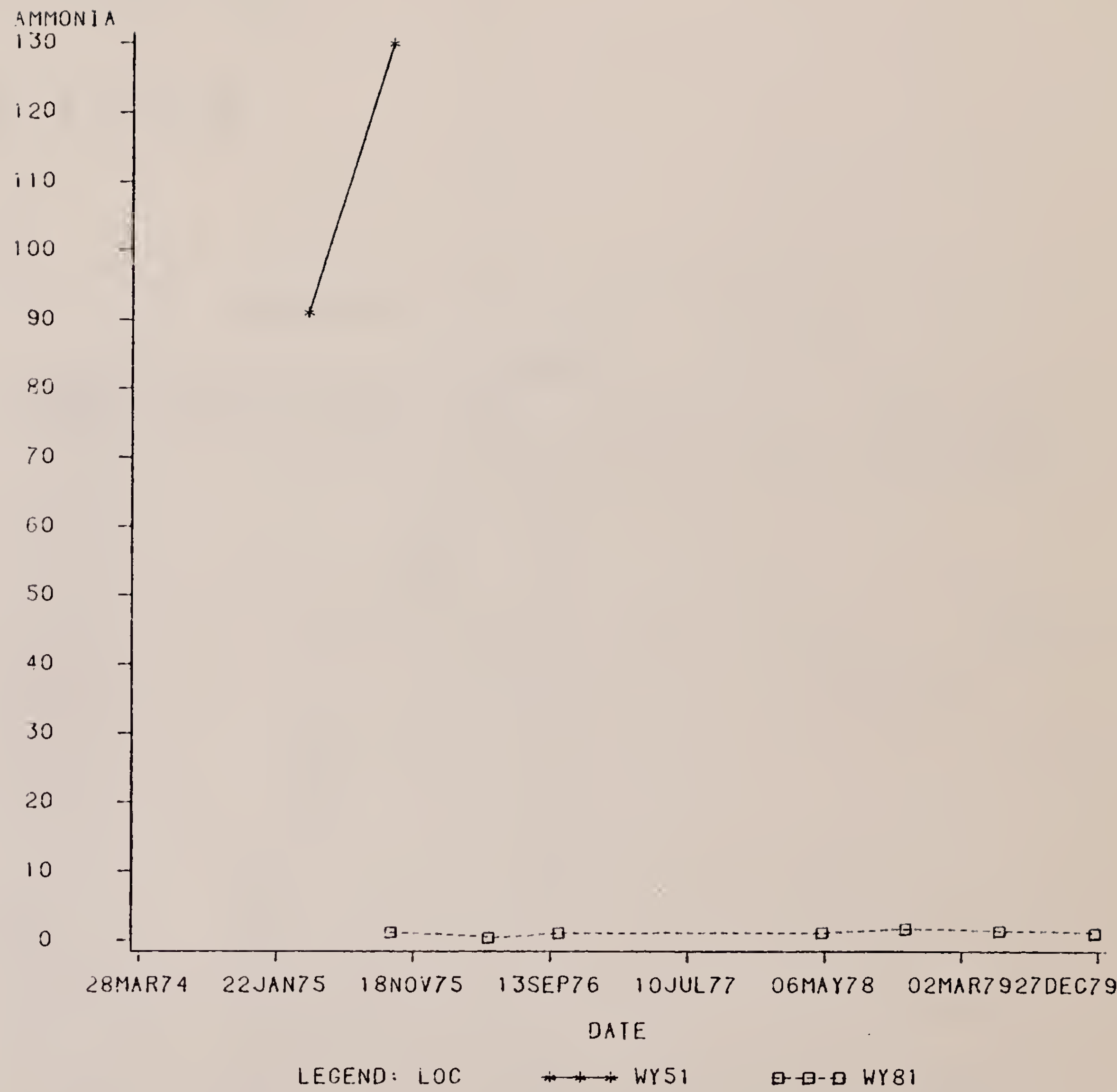
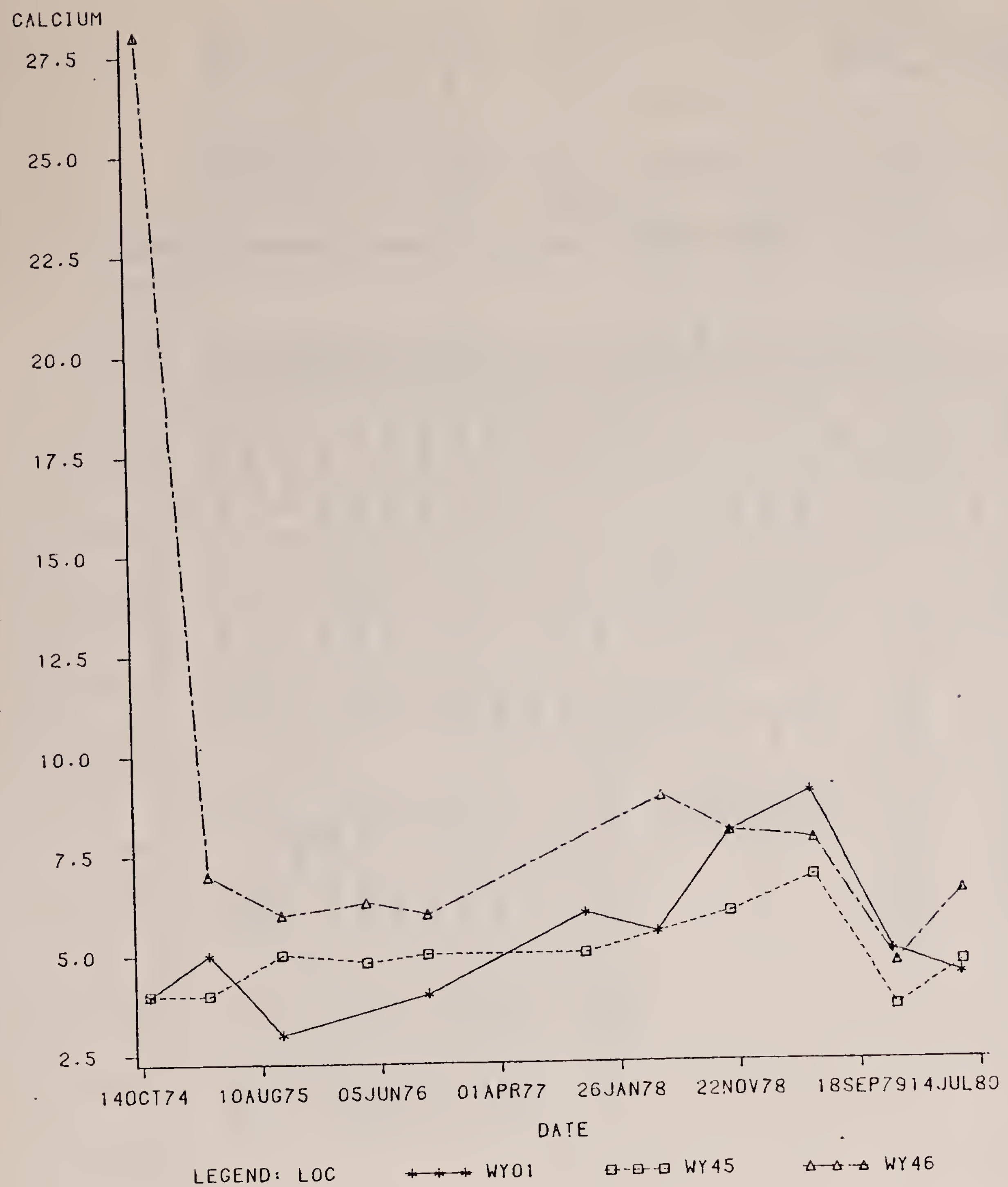


FIGURE A 5.3.5–6

WATER QUALITY FOR LOWER AQUIFER WELLS



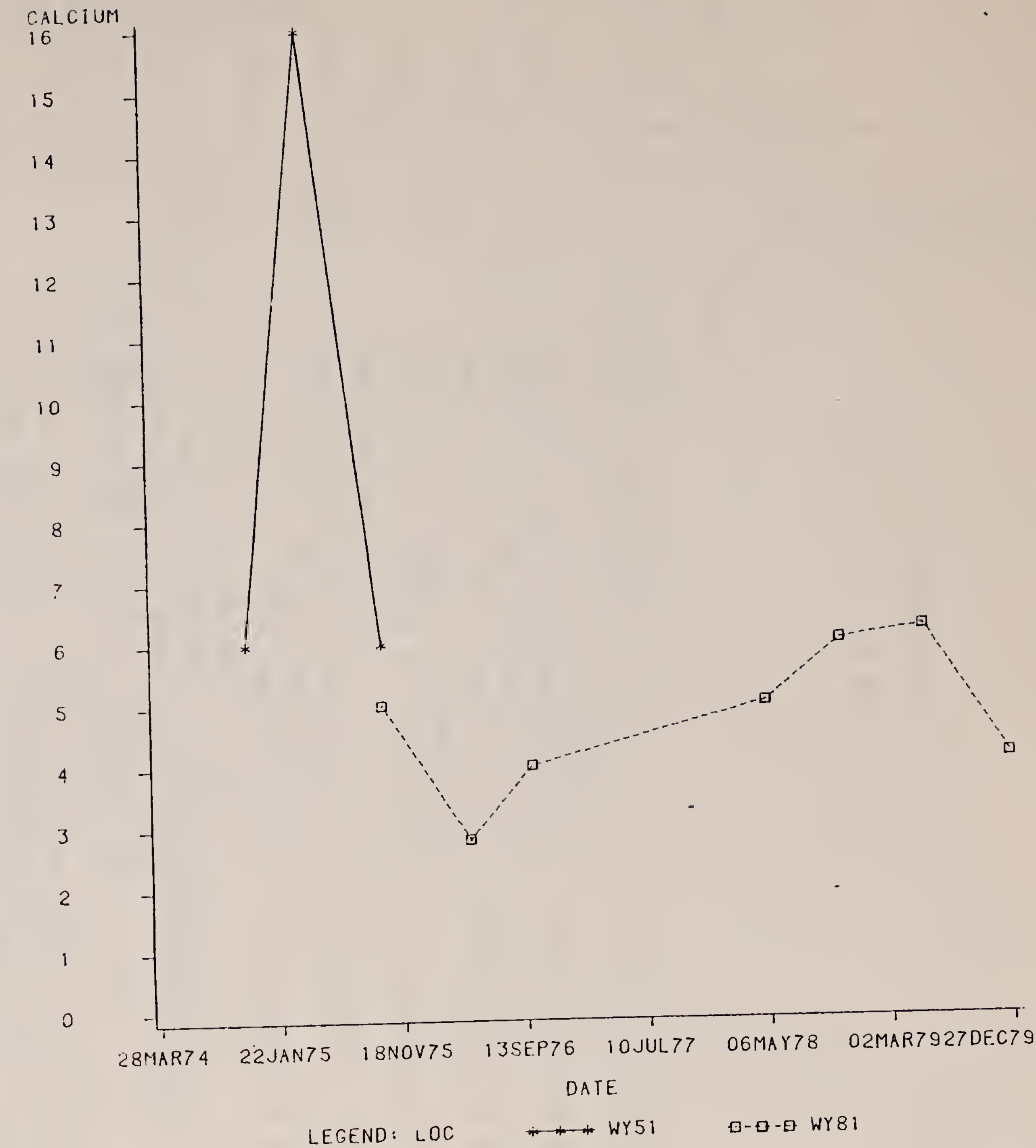


FIGURE A 5.3.5-7

WATER QUALITY FOR LOWER AQUIFER WELLS

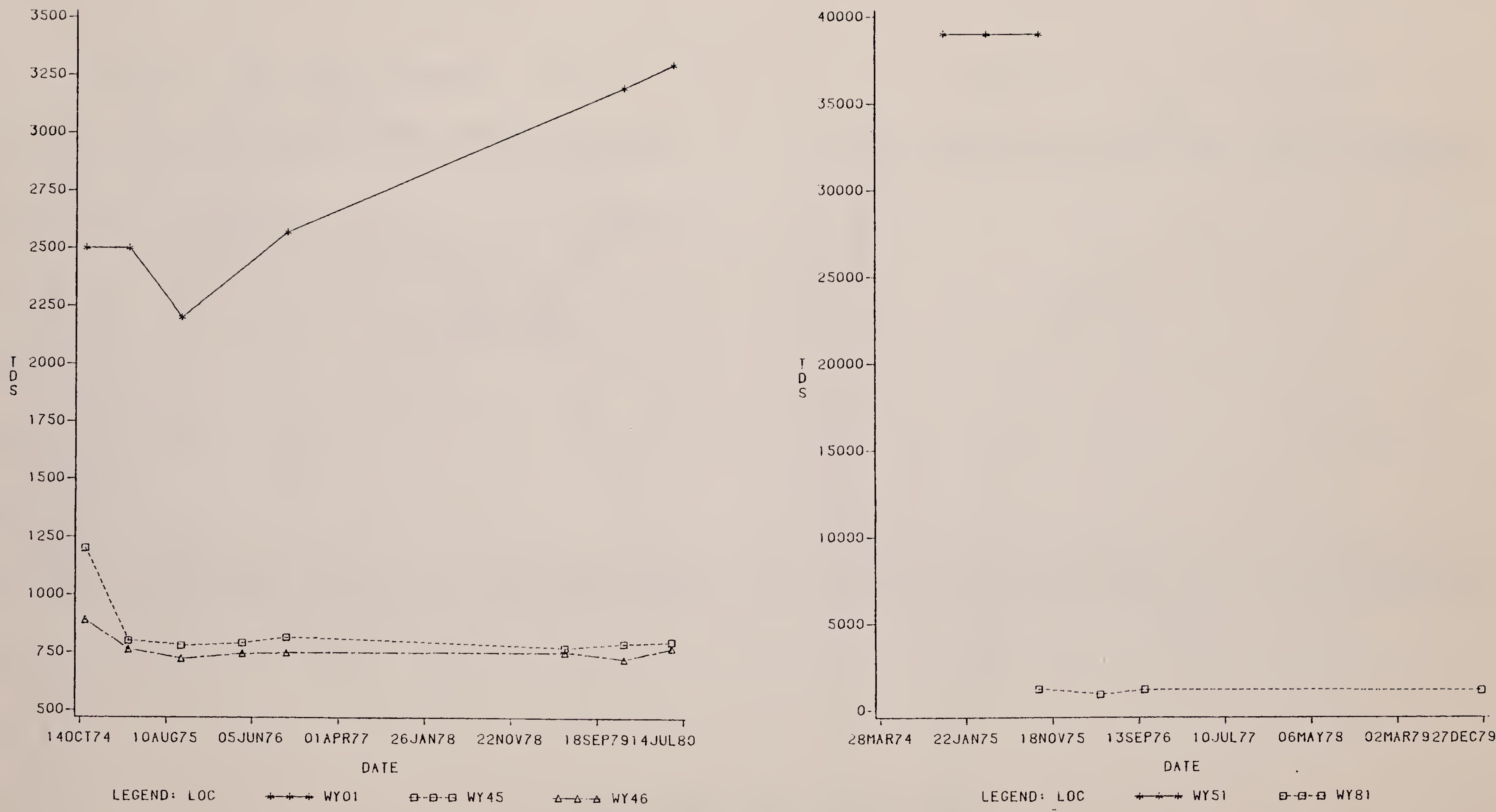


FIGURE A 5.3.5-8

WATER QUALITY FOR LOWER AQUIFER WELLS

CHAPTER 6.0

Air Quality and Meteorology

CHAPTER 6.0 (Continued)

TABLE A6.2.1-1

INSTRUMENT SPECIFICATIONS

These specifications apply to the analyzer types and time periods indicated. In some cases, current instruments will have different specifications, generally reflecting enhanced accuracy and sensitivity.

Sulfur dioxide/hydrogen sulfide November 1974 - March 1977 - Meloy SA-185-2

Range:	0 - 1 ppm (1000 ppb)
Lower Detection Limit:	.005 ppm
Noise:	± 0.5% (full scale)
Zero Drift:	± 1% per day
Span Drift:	± 1% per day
Precision:	± 1% (full scale)

March 1977 - Present - Meloy SA-185-2A

Range:	0 - .5 ppm
Lower Detection Limit:	.002 ppm
Noise:	.005 ppm
Zero Drift:	.001 ppm (24 hours)
Span Drift:	3.2% (80% URL)
Precision:	.001 ppm S.D. (20% URL) .002 ppm S.D. (80% URL)

Carbon Monoxide November 1974 - August 1978 - Bendix 8200 Environmental Chromatograph

Range:	0 - 1 ppm to 0 - 100 ppm, stepped
Noise:	0.5% of full scale
Zero Drift:	< 1% per day
Span Drift:	< 1% per day
Precision:	± 1% of full scale

TABLE A6.2.1-1 (cont.)

September 1978 - Present - Beckman Model 866 - Ambient CO Monitoring System

Range:	0 - 50 ppm
Lower Detection Limit:	0.4 ppm
Noise:	0.2 ppm S.D.
Zero Drift:	± 0.5 ppm (24 hours)
Span Drift:	± 1% full scale
Precision:	± 0.2 ppm S.D. full scale

Oxides of Nitrogen November 1974 - December 1977 - Meloy NA-520-2 Chemicuminizer

Range:	0 - .5 ppm
Lower Detection Limit:	.005 ppm
Noise:	.005 ppm
Zero Drift:	.005 ppm (24 hours)
Span Drift:	.010 ppm (24 hours)
Precision:	± 1% full scale

January 1978 - Present - Monitor Labs Model 8440E Nitrogen Oxides Analyzer

Range:	0 - .5 ppm
Lower Detection Limit:	.002 ppm
Noise:	.001 ppm S.D.
Zero Drift:	<. .003 ppm / 7 days
Span Drift:	< 4% / 7 days
Precision:	.004 ppm S.D. at 0.1 ppm

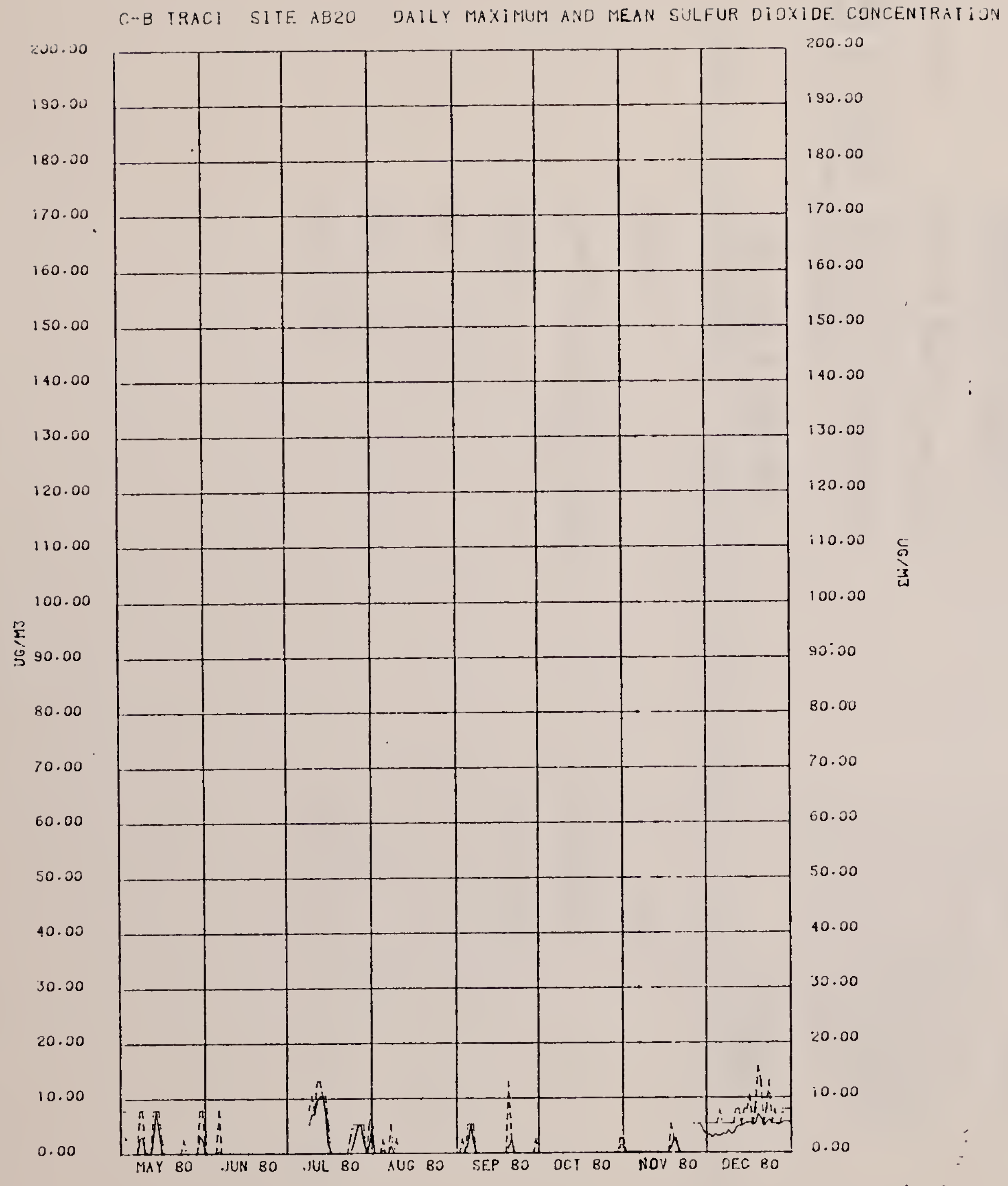
TABLE A6.2.1-1 (cont.)

Ozone November 1974 - March 1979 - Meloy OA-350-2 - Ozone Analyzer

Range:	0 - .5 ppm
Lower Detection Limit:	.0005 ppm
Noise:	± .3%
Zero Drift:	± 1% full scale/24 hours
Span Drift:	< ± full scale/24 hours
Precision:	± 2% full scale

Ozone April 1979 - April 1980 - Meloy OA-350-2R - Ozone Analyzer

Range:	0 - .5 ppm
Lower Detection Limit:	.002 ppm
Noise:	.0005 ppm @ 20% URL .002 ppm @ 80% URL
Zero Drift:	12 hours and 24 hours ± .002 ppm
Span Drift:	24 hours ± 1.5% of reading @ 20% URL ± 2.5% of reading @ 80% URL
Precision:	.001 ppm @ 20% URL @ 80% URL



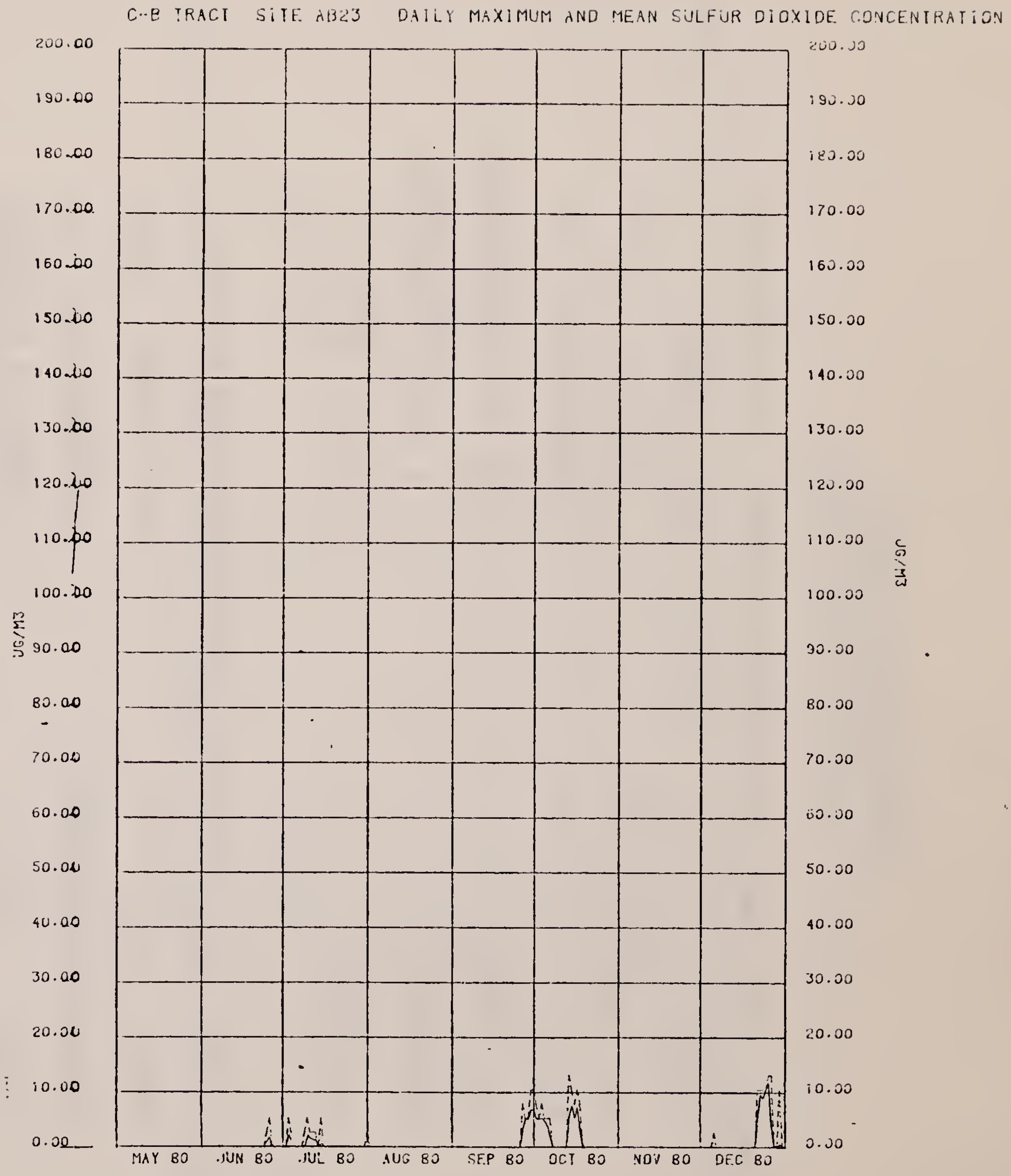


FIGURE A6.2.1-1

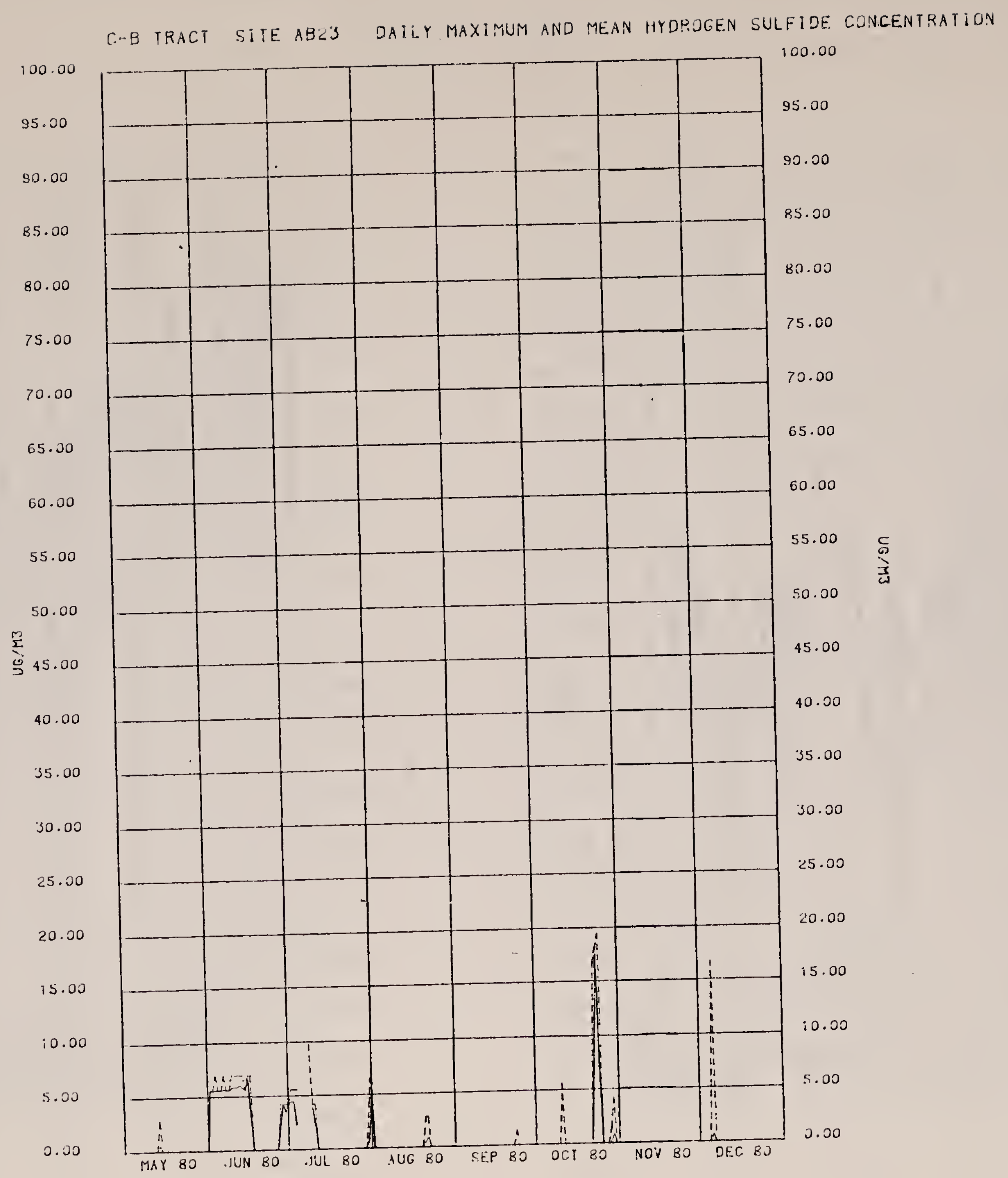
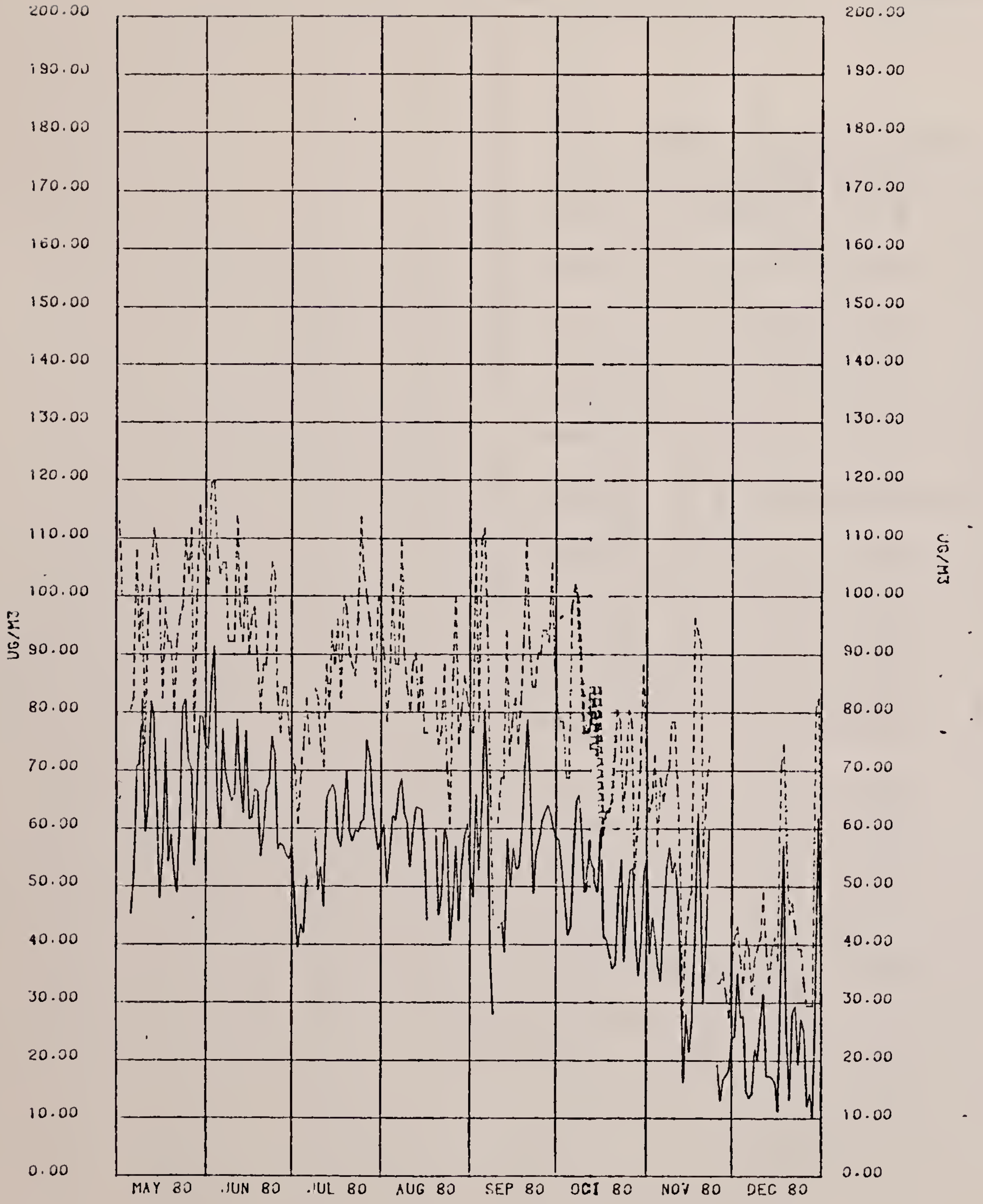


FIGURE A6.2.1-2

C-B TRACT SITE AB20 DAILY MAXIMUM AND MEAN OZONE CONCENTRATION



C-B TRACT SITE AB23 DAILY MAXIMUM AND MEAN OZONE CONCENTRATION

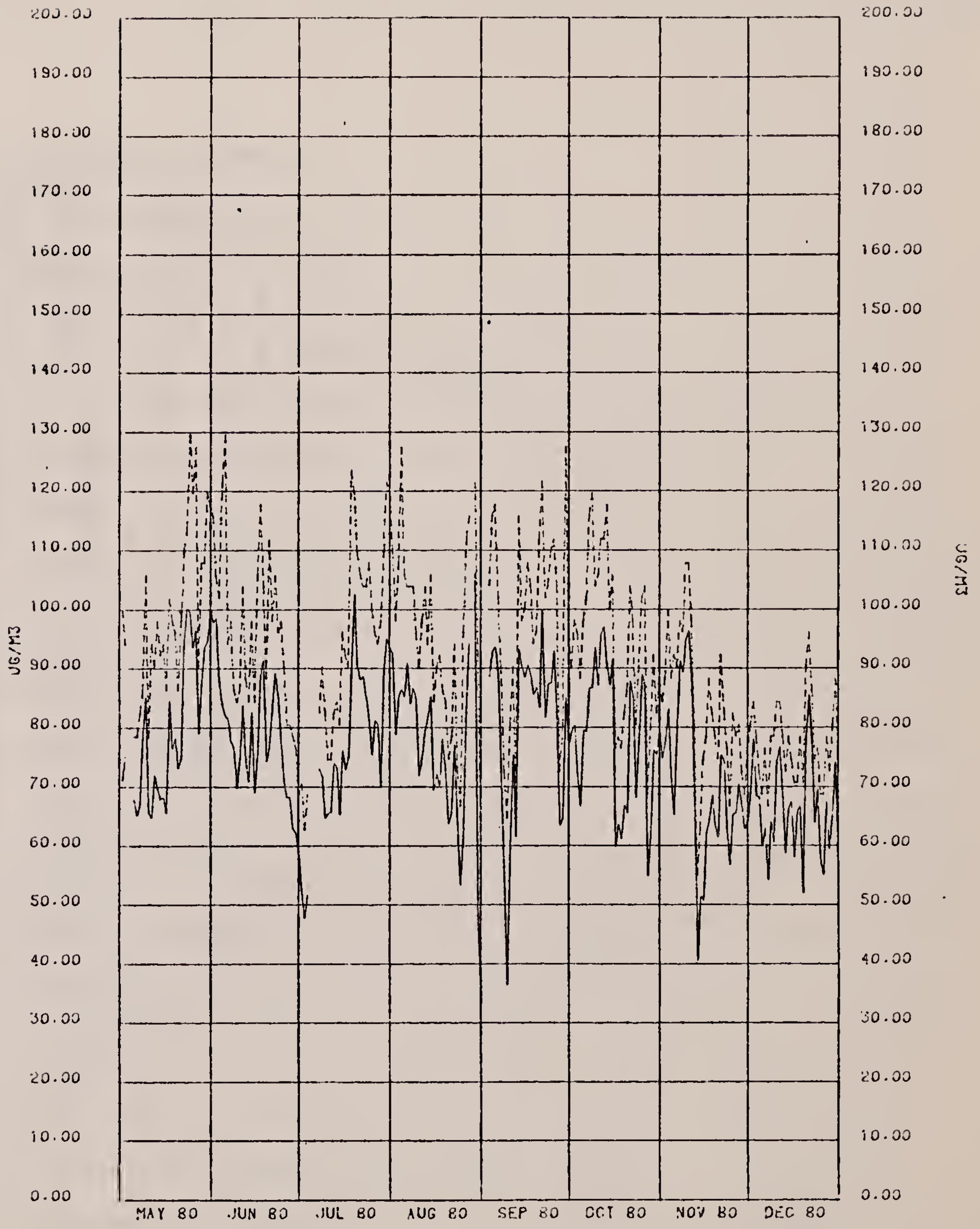
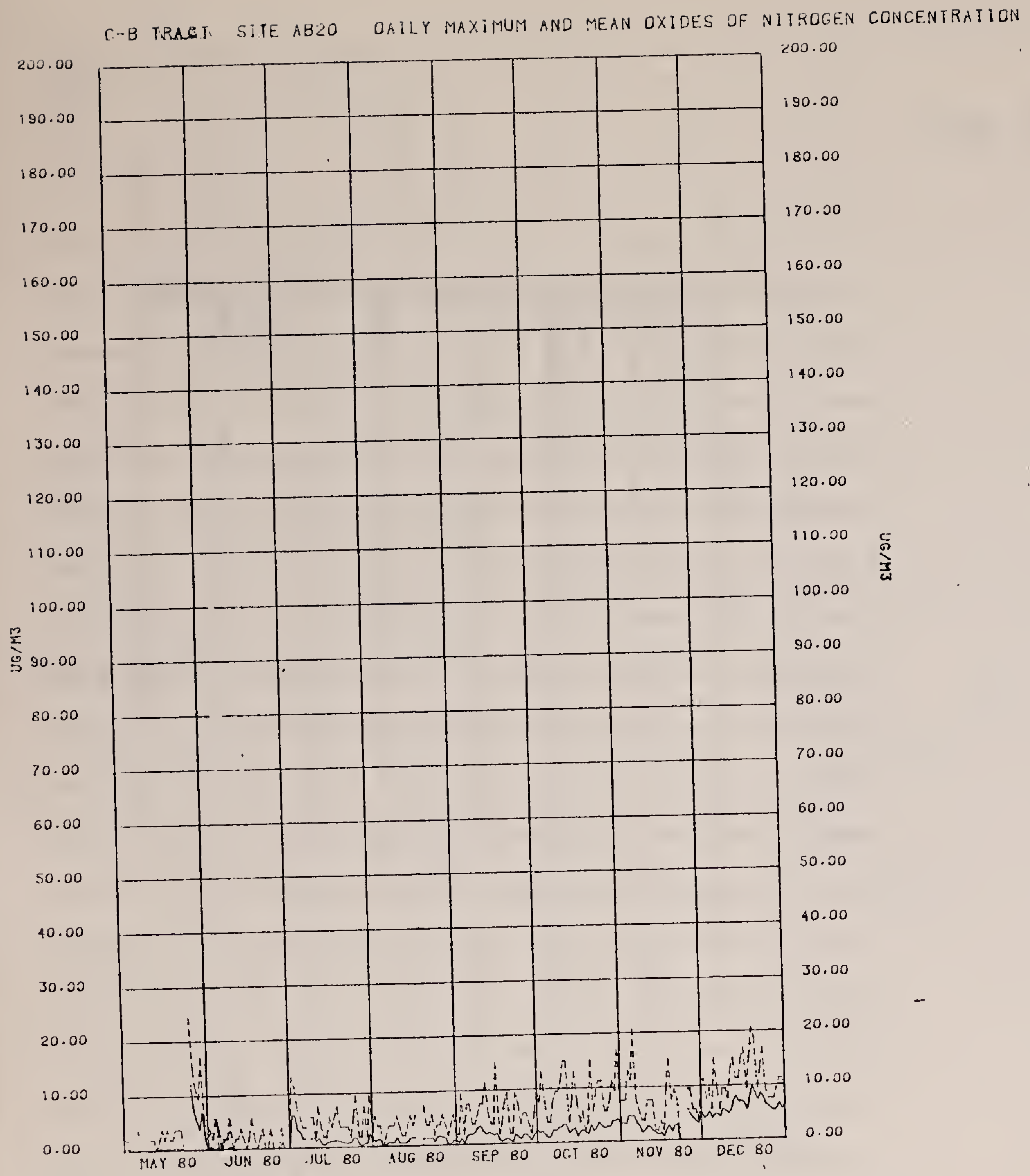


FIGURE A6.2.1-3



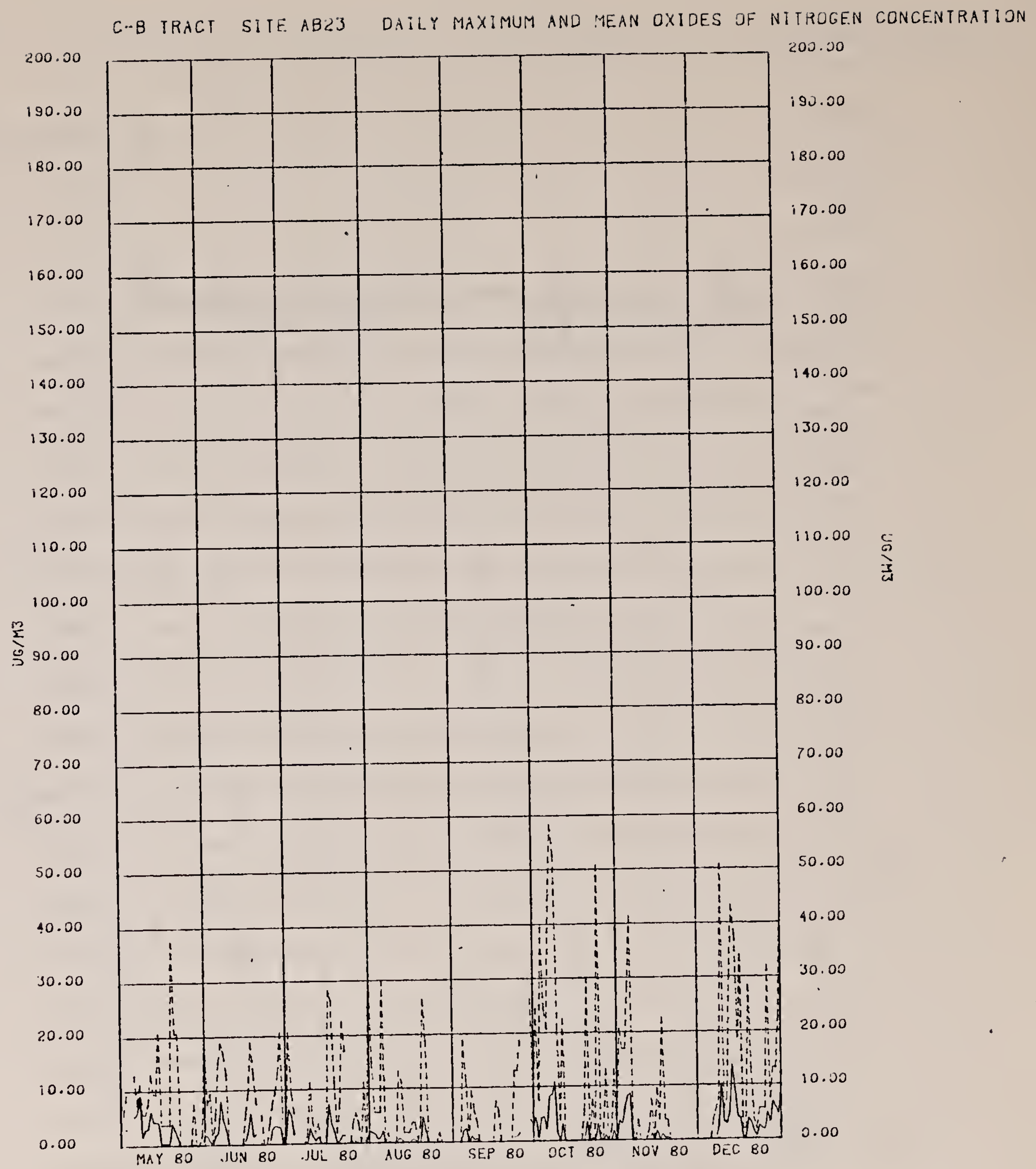
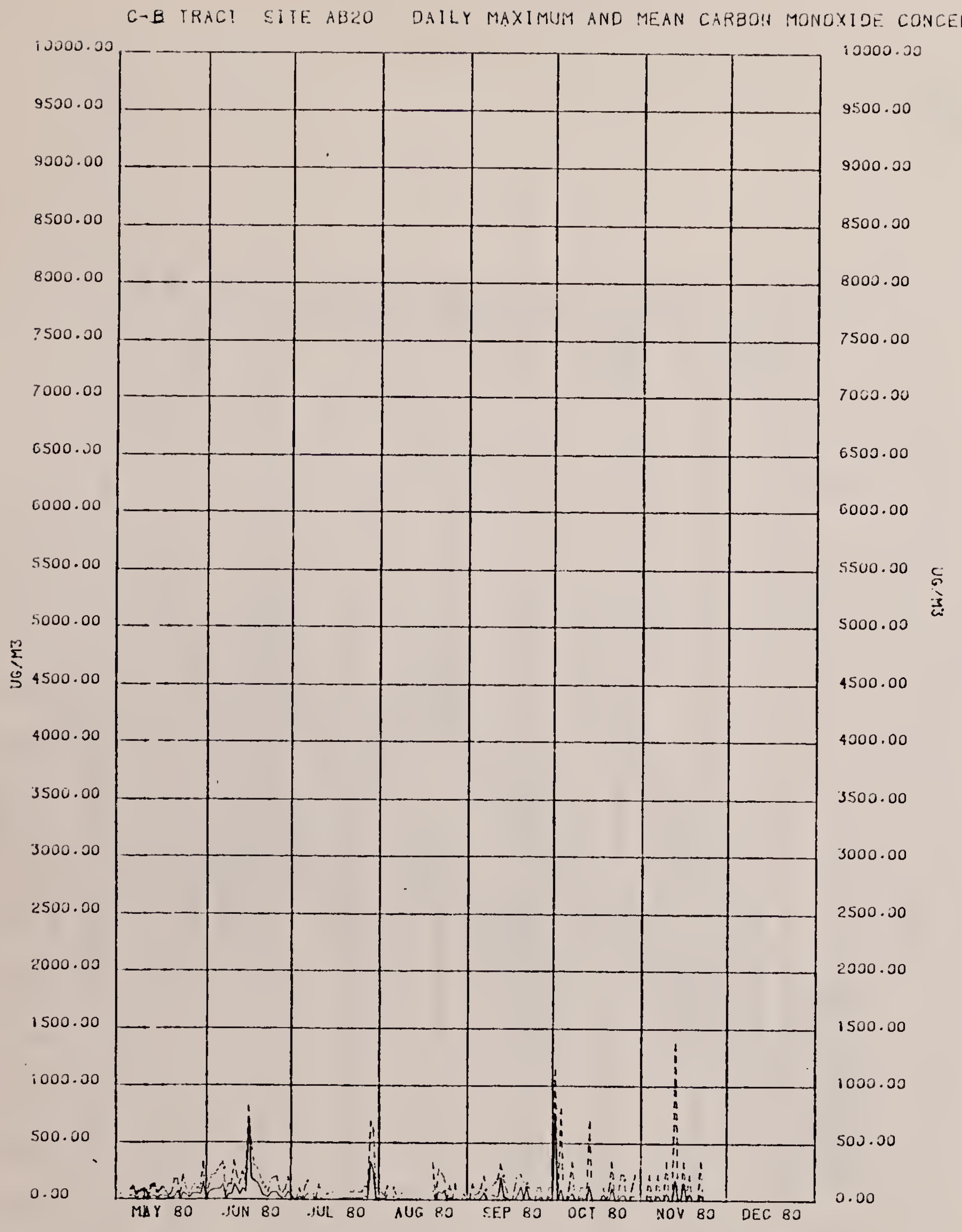


FIGURE A6.2.1-4



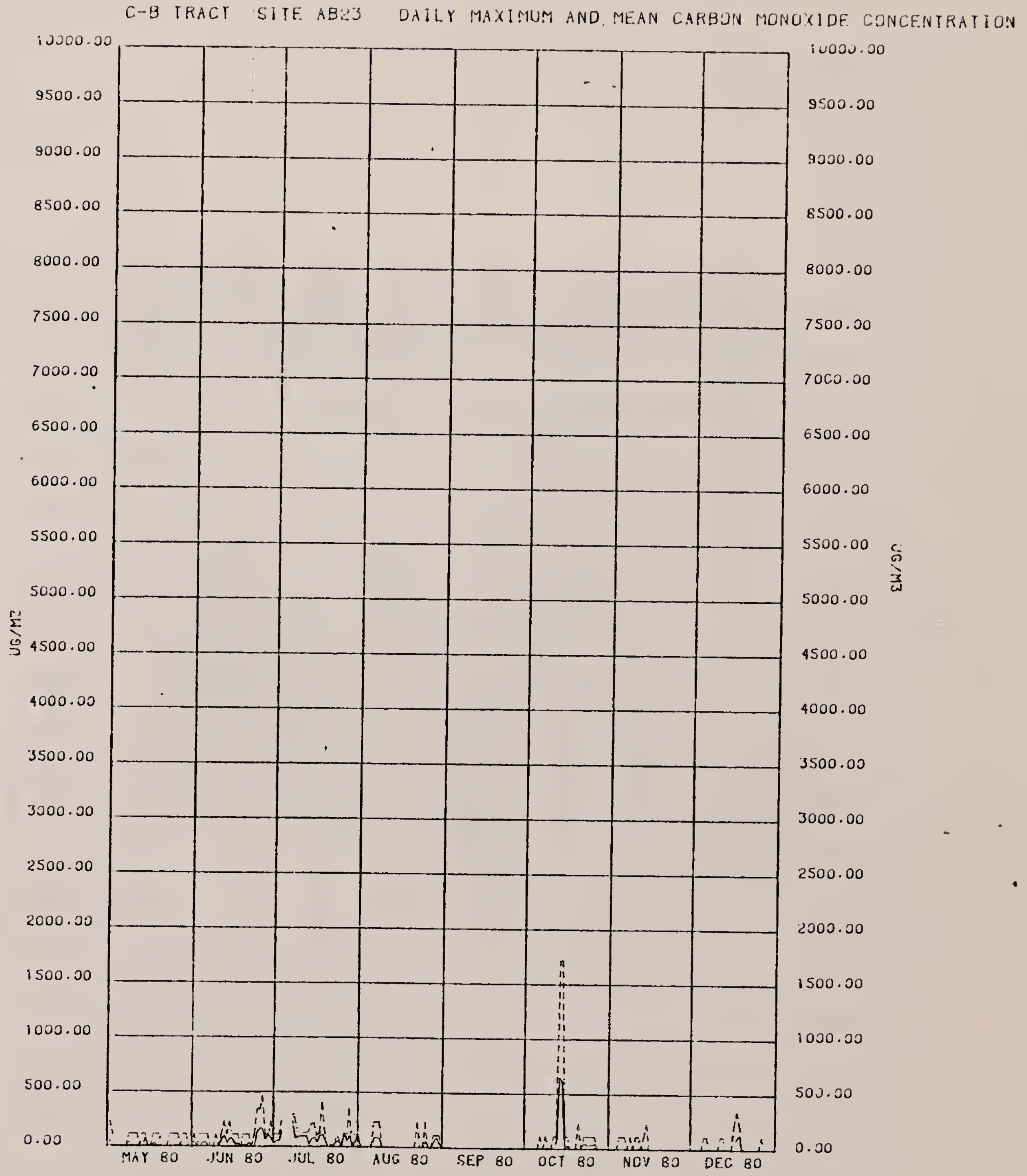
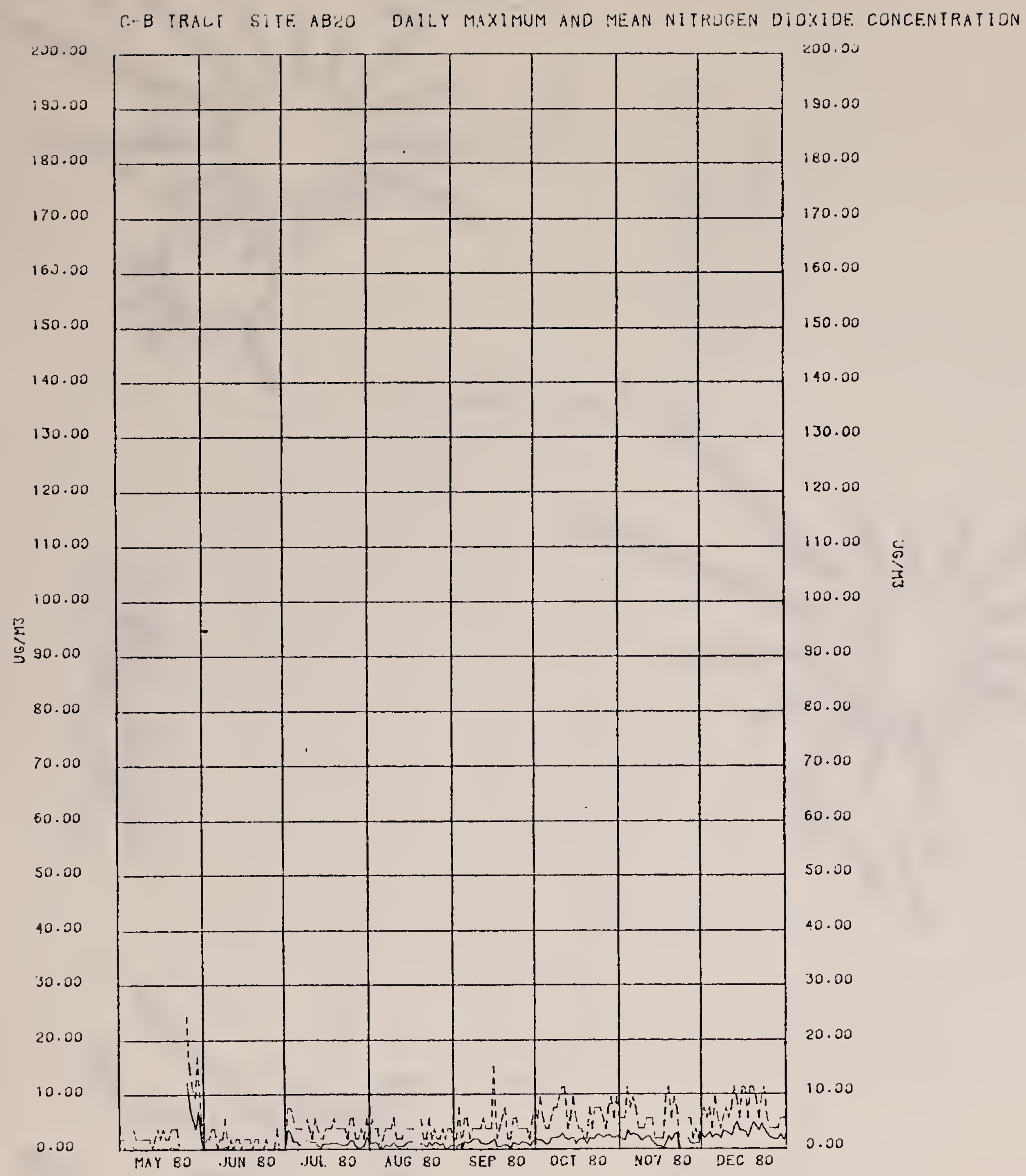


FIGURE A6.2.1-5



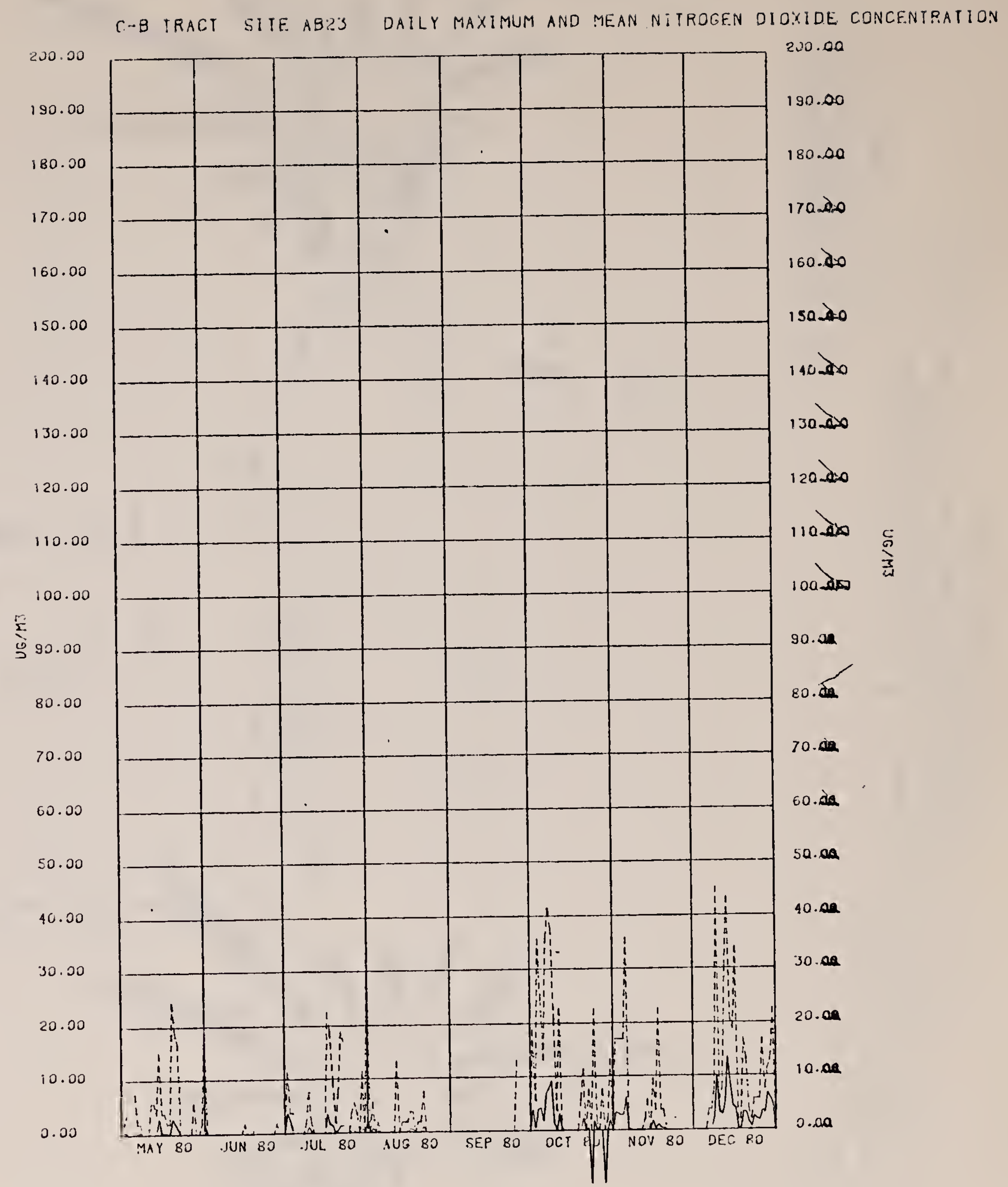


FIGURE A6.2.1-6

FIGURE A6.2.1-1

AB20 Quarterly and Annual O_3 Concentration Roses

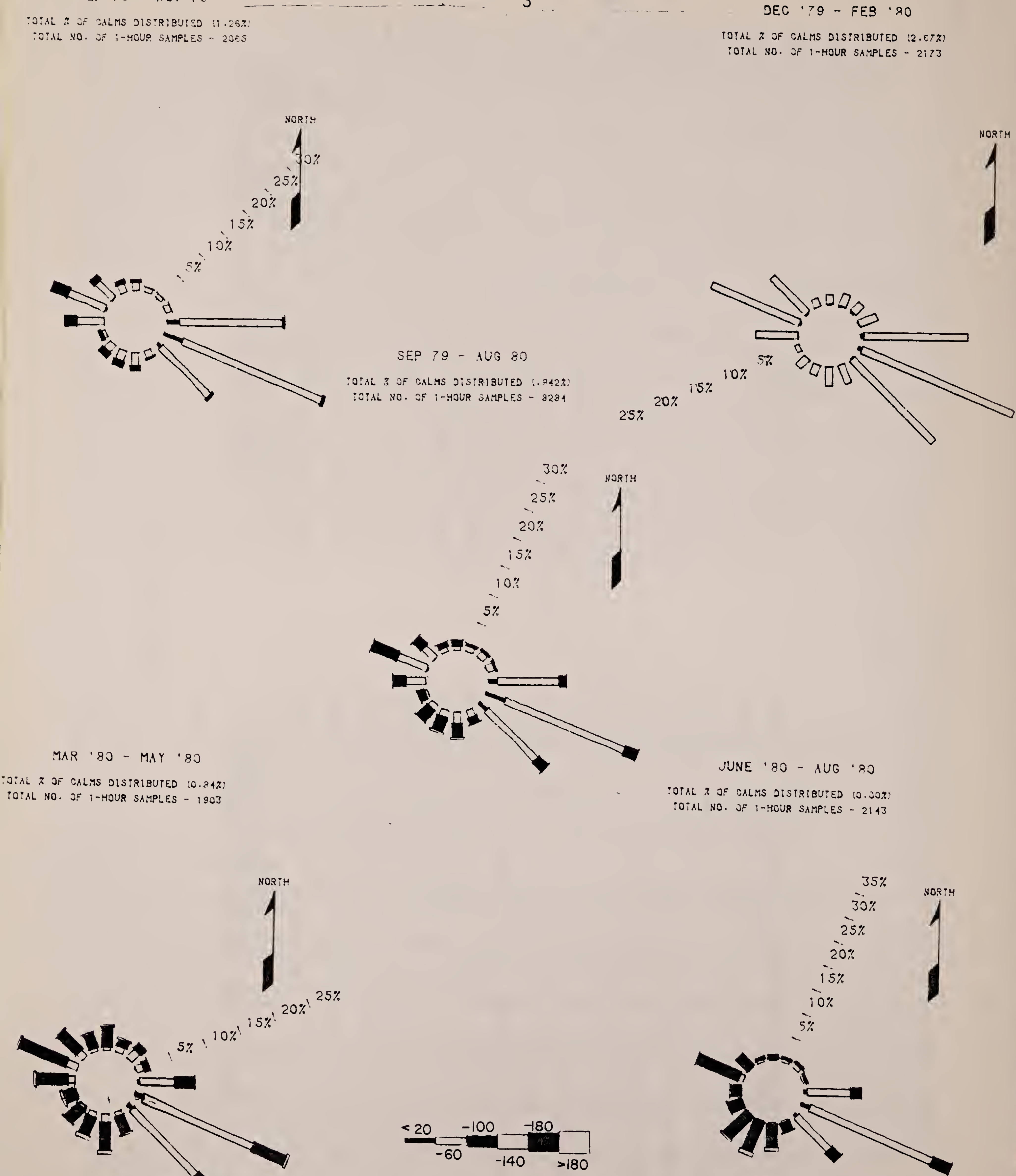


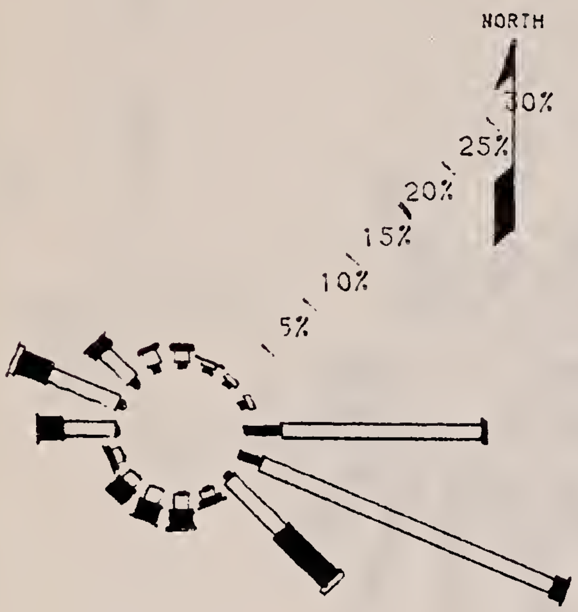
FIGURE A6.2.1-2
AB23 Quarterly and Annual O_3 Concentration Roses

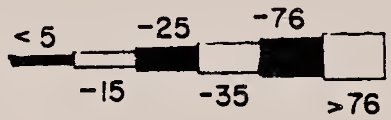
FIGURE A6.2.2-1

AB20 Quarterly Particulate Roses

SEP '79 - NOV '79

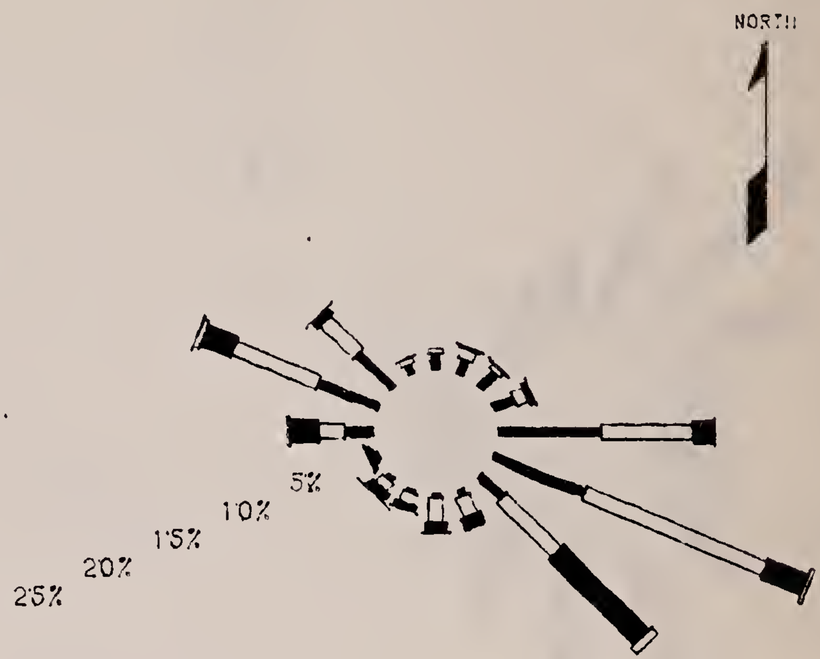
TOTAL % OF CALMS DISTRIBUTED (0.24%)
TOTAL NO. OF 1-HOUR SAMPLES - 2043





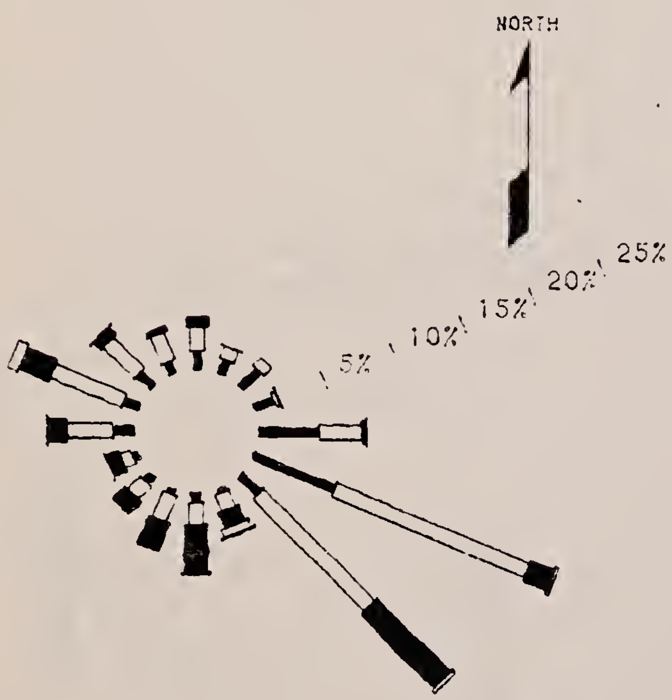
DEC '79 - FEB '80

TOTAL % OF CALMS DISTRIBUTED (2.67%)
TOTAL NO. OF 1-HOUR SAMPLES - 2172



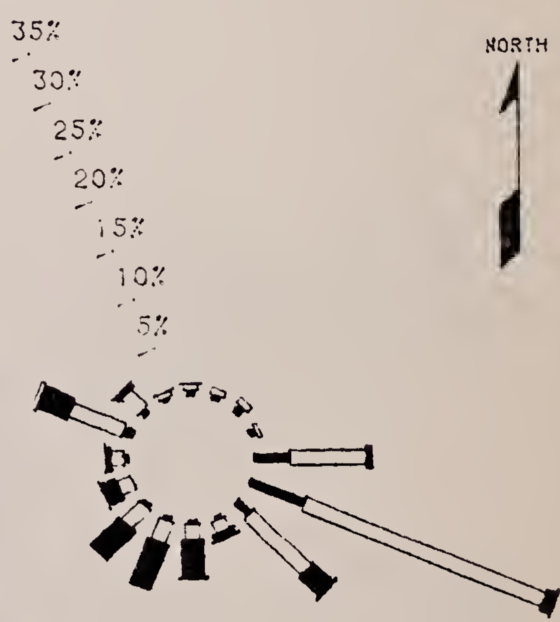
MAR '80 - MAY '80

TOTAL % OF CALMS DISTRIBUTED (0.75%)
TOTAL NO. OF 1-HOUR SAMPLES - 2130



JUN '80 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 2144



SEP '80 - NOV '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 2103

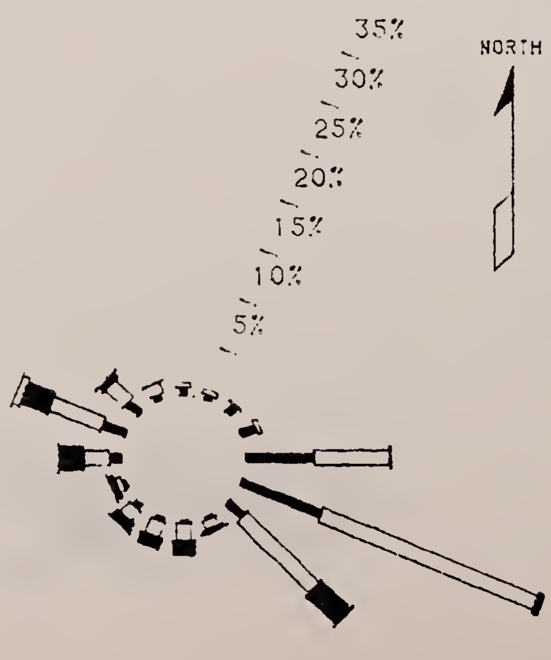


FIGURE A6.2.2-2

AB23 Quarterly Particulate Roses

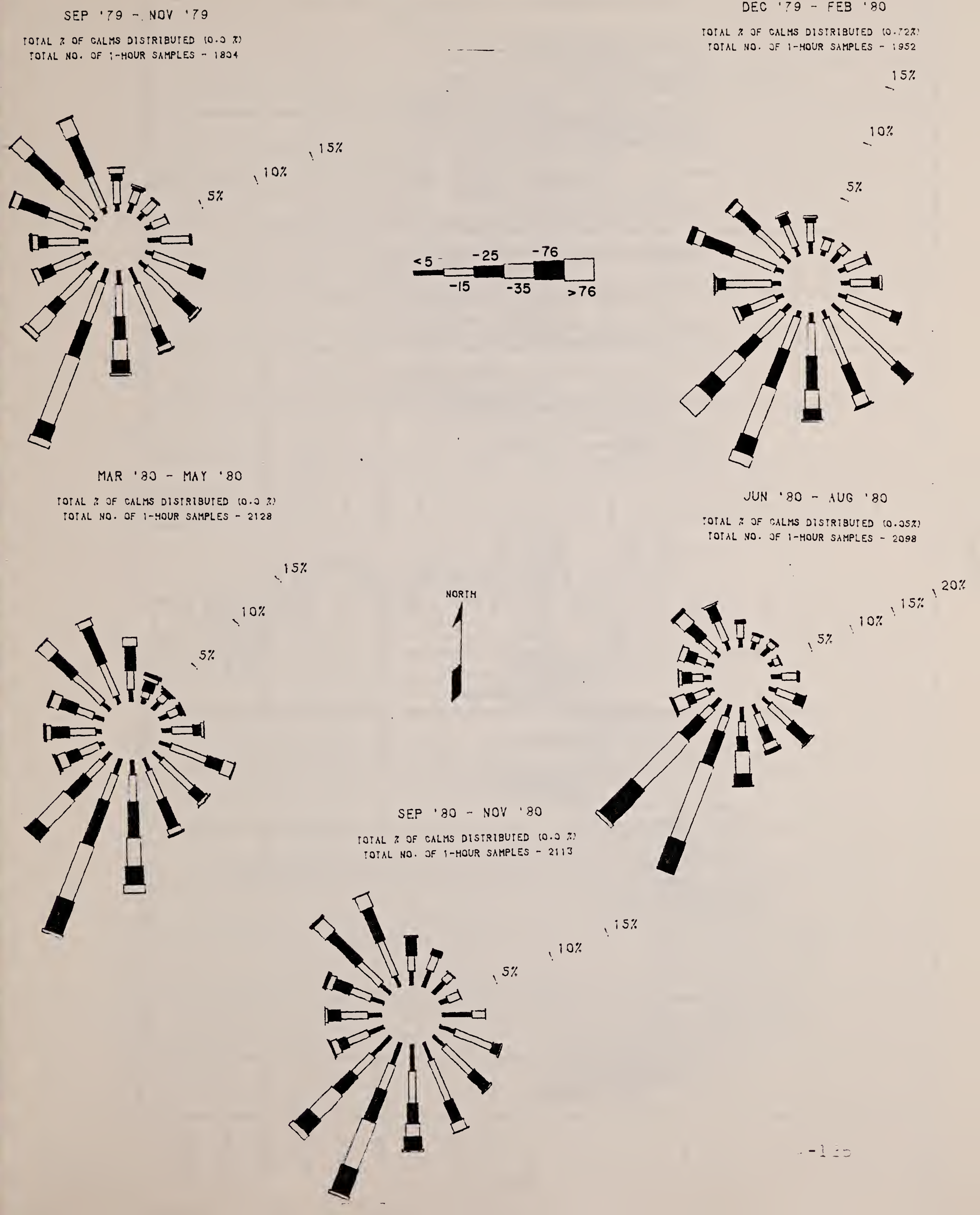
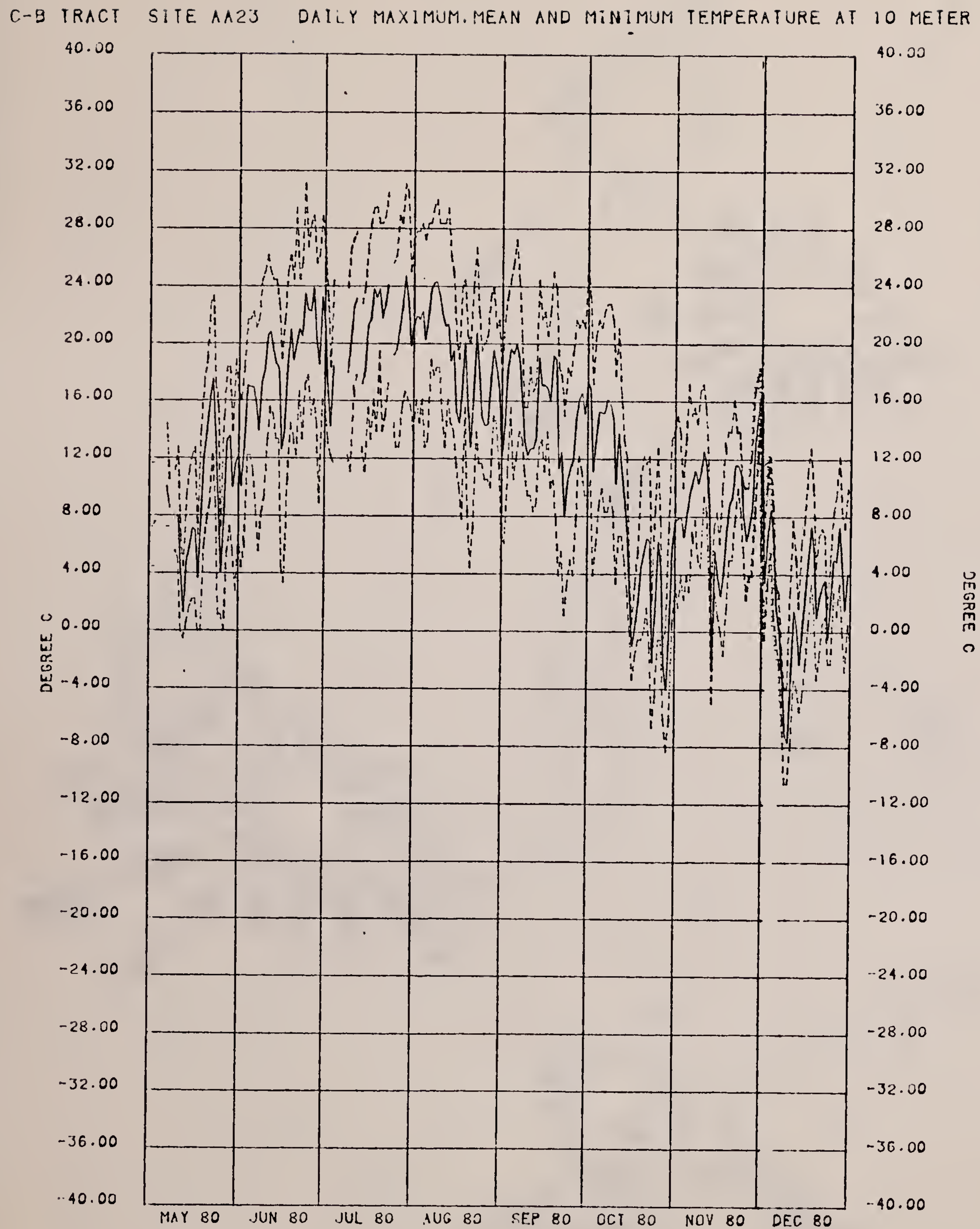


FIGURE A6.3.1-1



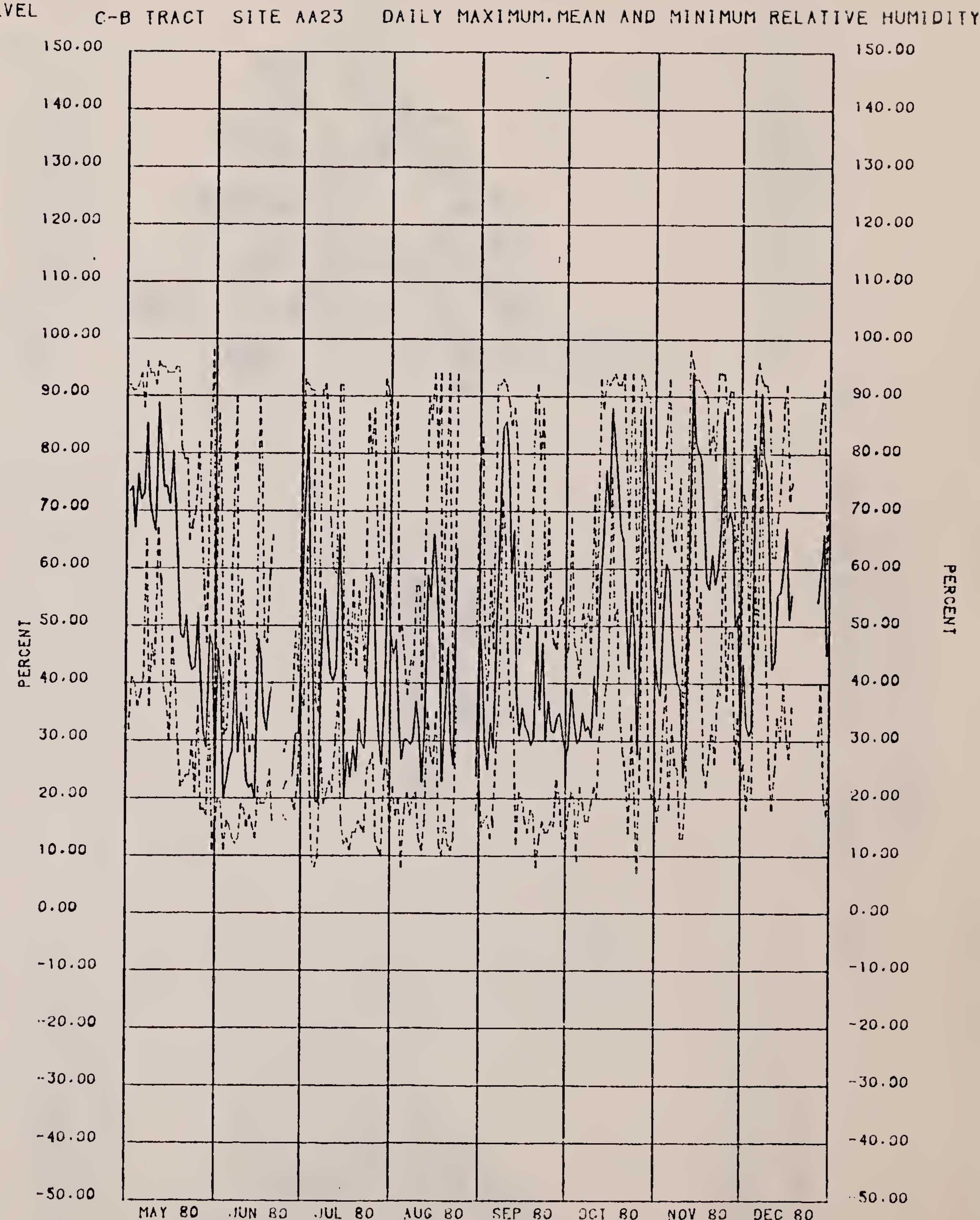


FIGURE A6.3.1-2

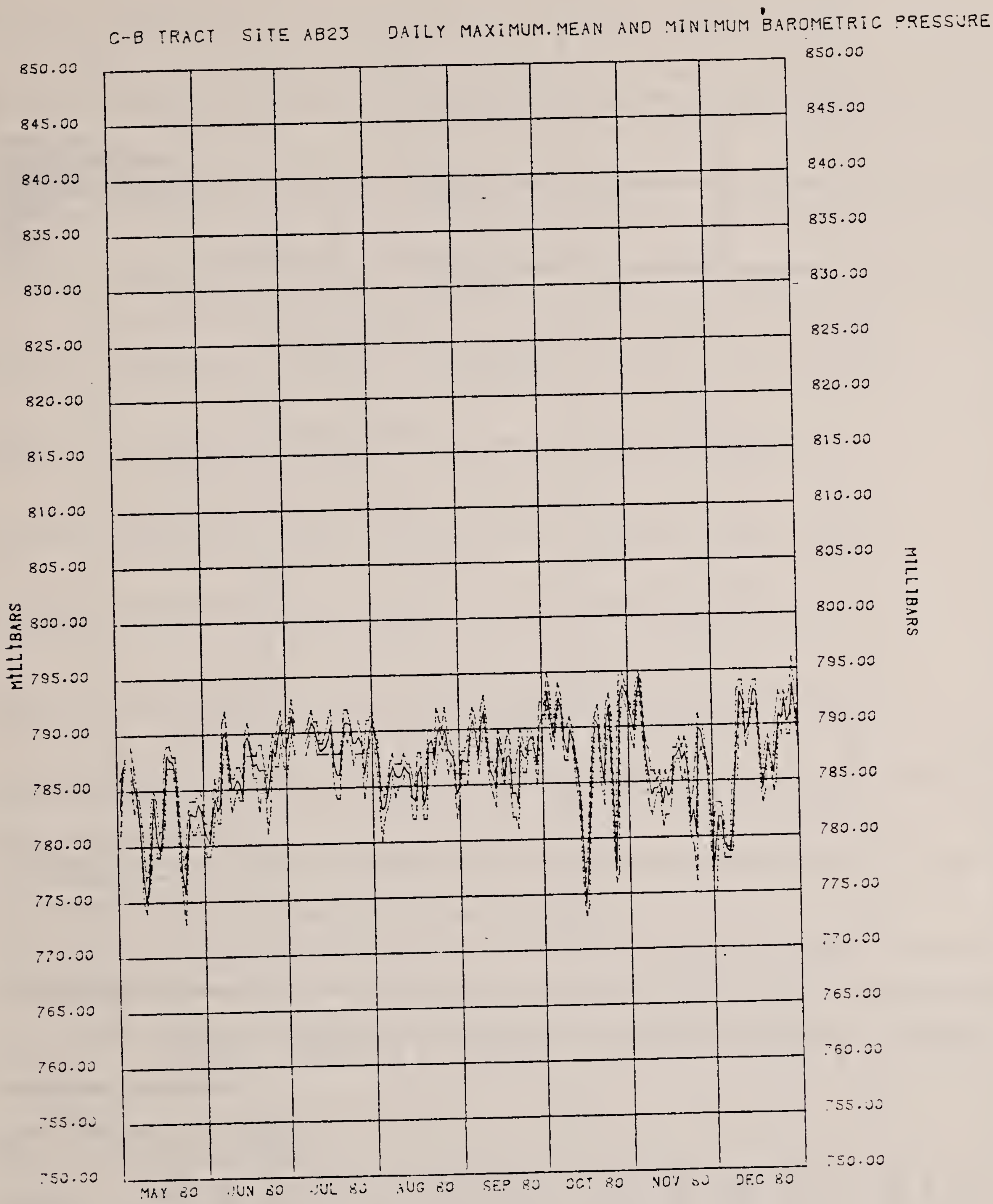
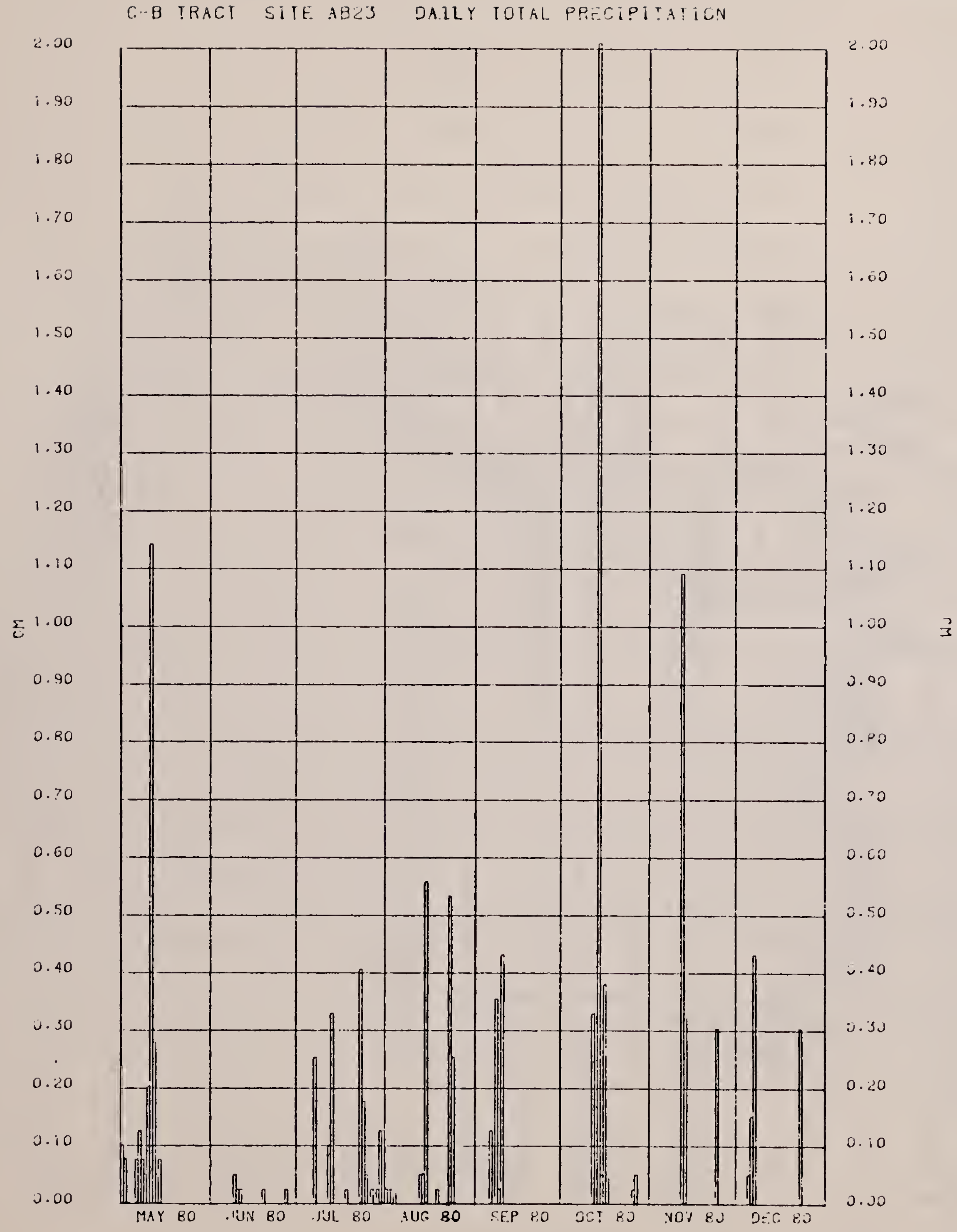


FIGURE A6.3.1-3



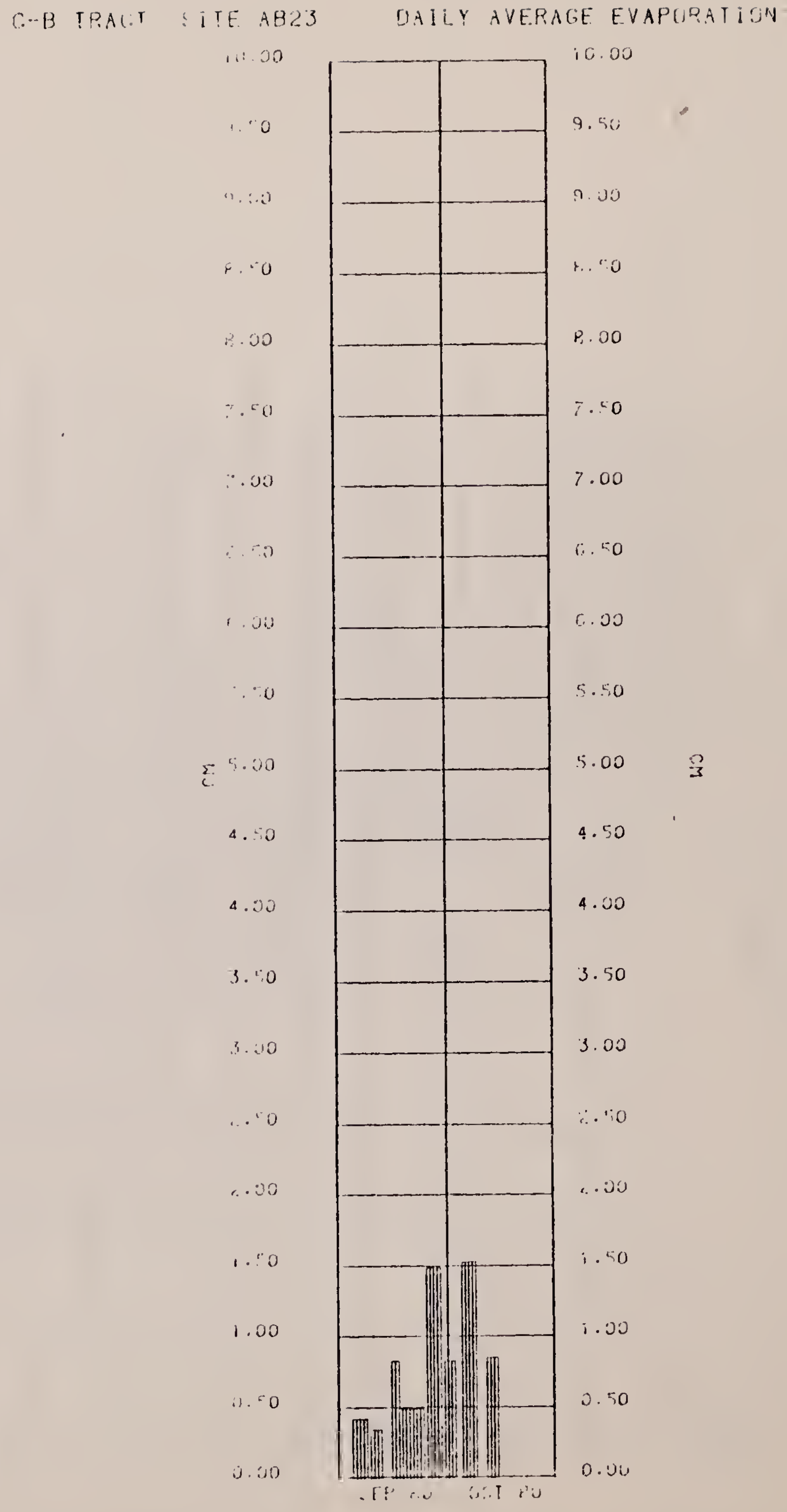


TABLE A6.3.1-2

AIR TEMPERATURE, 10m (°C)

STA.	ITEM	SEASONAL YEAR	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	ANN. MAX. AVG. MIN.
AB20	HOURLY MAX.	1975	7	10	8	15	21	26	31	32	31	28	25	18	32
AB23	" "	1975	9	6	6	10	20	22	28	29	28	26	22	17	29
AB20	HOURLY AVG.	1975	-11	-9	-7	0	2	9	14	19	17	12	6	-3	4
AB23	" "	1975	-4	-5	-4	-1	2	8	13	19	18	13	8	0	6
AB20	HOURLY MIN.	1975	-34	-43	-31	-33	-28	-9	-1	6	-2	-8	-18	-27	-43
AB23	" "	1975	-18	-21	-18	-21	-14	-6	1	11	4	-2	-10	-16	-21
AB20	HOURLY MAX.	1976	11	8	11	13	20	27(1)	30	34	31	30	25	(2)	34
AB23	" "	1976	10	8	9	11	17	23	28	31	27	27	22	15	31
AB20	HOURLY AVG.	1976	-6	-9	-3	-4	4	11	15	21	18	13	3	(2)	
AB23	" "	1976	-2	-4	-1	-2	6	11	16	21	18	13	6	1	7
AB20	HOURLY MIN.	1976	-26	-41	-29	-32	-9	-7(1)	-8	4	1	-4	-14	(2)	-41
AB23	" "	1976	-14	-21	-14	-15	-6	-3	-6	10	6	2	-9	-19	-21
AB20	HOURLY MAX.	1977													
AB23	" "	1977	8	7	12	12	19	22(1)	28(1)	28(1)	29	34	22	18	34
AB20	HOURLY AVG.	1977													
AB23	" "	1977	-3	-5	-2	-2	6	9(1)	20(1)	21(1)	19	15	5	3	7
AB20	HOURLY MIN.	1977													
AB23	" "	1977	-13	-20	-13	-16	-11	-2(1)	7(1)	11(1)	3	-4	-12	-17	-20
AB20	HOURLY MAX.	1978								(2)	29	27	23	19	
AB23	" "	1978	13	13	6	15	18	24	28	31	29	28	25	18	31
AB20	HOURLY AVG.	1978								(2)	17	14	9	2	
AB23	" "	1978	4	7	-3	2	6	9	17	21	18	15	10	1	9
AB20	HOURLY MIN.	1978								(2)	2	-4	-6	-11	
AB23	" "	1978	-8	-2	-15	-11	-5	-4	2	7	2	-3	-3	-16	-16
AB20	HOURLY MAX.	1979	7	6	12	13	19	(3)	(3)	(3)	32	31	28	13	32
AB23	" "	1979	5	3	11	9	18	22	30	31	35	31	28	13	35
AB20	HOURLY AVG.	1979	-6	-7	-1	3	7	(3)	(3)	(3)	17	16	8	-4	
AB23	" "	1979	-6	-8	-2	0	5	9	17	20	19	17	9	-	
AB20	HOURLY MIN.	1979	-31	-30	-23	-13	-9	(3)	(3)	(3)	6	-1	-16	-24	-31
AB23	" "	1979	-23	-26	-17	-12	-10	-3	0	9	8	1	-14	-14	-26
AB20	HOURLY MAX.	1980	11	9	13	12	23	26	32	33	32	30	26	21	33
AB23	" "	1980	9	6	10	9	20	23	31	31	30	27	23	18	31
AB20	HOURLY AVG.	1980	-5	-3	-1	1	6	11	18	21	19	14	7	1	7
AB23	" "	1980	-2	-4	-1	-1	5	9	19	21	19	15	7	9	8
AB20	HOURLY MIN.	1980	-26	-23	-22	-16	-9	-1	1	8	3	-3	-9	-14	-26
AB23	" "	1980	-17	-16	-17	-13	-9	-1	3	11	4	1	-8	-5	-17
AB20	HOURLY MAX.	1981	17												
AB23	" "	1981	13												
AB20	HOURLY AVG.	1981	2												
AB23	" "	1981	2												
AB20	HOURLY MIN.	1981	-13												
AB23	" "	1981	-11												

(1) Partial Data Only

(2) Station Inoperative

(3) Instrument Malfunction

TABLE A6.3.1-3

GROWING SEASON AND DEGREE-DAYS BY YEAR

YEAR	GROWING SEASON*			DEGREE-DAYS** (^{o}C-DAYS) IN				
	START	STOP	LENGTH (days)	GROWING SEASON	APR-MAY-JUN	MAY-JUN-JUL	JUN-JUL-AUG	JUL-AUG-SEPT
1975	May 26	Sept 21	118	84	8	57	84	76
1976	June 14	Oct 5	111	111	15	87	108	93
1977	Apr 21	Sept 14	144	110	23	70	110	87
1978	May 15	Sept 17	124	223	33	121	169	163
1979	May 12	Oct 9	148	196	35	109	171	161
1980	May 12	Oct 15	151	168	44	106	161	124

* Hourly minimum air temperature always > 0^{o}C

** T_{av} - 18.3 ^{o}C X (No. of days in month for which T_{av} applies) Summed over appropriate number of months

Where T_{av} = daily average temperature (^{o}C) specifically for those days whose average is over 18.3 ^{o}C.

(Ref: Munn, R.E., Biometeorological Methods, Academic Press, New York, N.Y., 1970.)

TABLE A6.3.1-4

Direct Solar Radiation

STATION AB23

MONTH/ YEAR	TOTAL LANG. FOR MONTH UNMOD.	MOD.*	AVG. DAY-LIGHT HRS/DAY	DAYLIGHT HRS PER MONTH	UPTIME DAYLIGHT HRS/MO.	CORR. FACTOR = 5 6	AVG. LANG/DAY (MOD.)	DAILY TOTAL/DATE HIGHEST	LOWEST
1	2	3 = 2 x 7	4	5	6	7	8/ (Days Per Mo.)	9	10
11/74	4121	4256	10	300	291	1.031	141.9	225/11	1/3
12/74	1878	3500	10	310	167	1.856	112.9	164/9	0/7
1/75	4036	4396	10	310	284	1.092	141.8	266/1	22/28
2/75	6880	7305	11	308	291	1.058	260.9	416/24	100/15
3/75	7586	10076	12	372	280	1.329	325.0	479/19	142/9
4/75	10940	11325	13	390	375	1.040	377.5	550/25	65/7
5/75	14559	14559	14	434	434	1.000	496.6	706/26	94/28
6/75	13762	15667	15	450	395	1.139	522.2	737/26	166/18
7/75	16079	16659	15	465	447	1.040	537.4	687/6	227/16
8/75	15005	15870	14	434	409	1.061	511.9	665/3	324/13
9/75	11849	12324	13	390	375	1.040	410.8	545/6	180/11
10/75	10089	10114	12	372	372	1.000	326.3	446/1	28/31
11/75	4615	4670	10	300	297	1.010	155.7	279/1	11/28
12/75	3957	4007	10	310	307	1.010	129.3	207/18	13/25
1/76	6166	6176	10	310	310	1.000	199.2	303/29	85/5
2/76	8102	8102	11	319	319	1.000	279.4	393/22	59/6
3/76	11856	12046	12	372	365	1.019	388.6	567/30	133/25
4/76	11990	13225	13	390	355	1.099	440.8	656/28	187/17
5/76	14693	15198	14	434	421	1.031	490.3	732/16	224/6
6/76	18674	18689	15	450	450	1.000	623.0	741/21	227/22
7/76	17102	17292	15	465	460	1.011	557.8	720/4	229/5
8/76	15351	15961	14	434	417	1.041	514.9	665/5	193/1
9/76	11477	11477	13	390	390	1.000	382.6	558/2	155/24
10/76	10178	10178	12	372	372	1.000	328.3	440/7	143/26
11/76	6725	6725	10	300	299	1.003	224.9	307/1	75/13
12/76	5685	5685	10	310	310	1.000	183.4	242/1	73/5
1/77	6043	6043	10	310	309	1.003	194.9	376/25	54/5
2/77	7850	7850	11	308	308	1.000	280.4	409/27	92/22
3/77	10737	11059	12	372	360	1.033	356.7	523/27	110/17
4/77	12870	12870	13	390	390	1.000	429.0	598/10&24	90/19
5/77	16228	16390	14	434	431	1.007	528.7	717/18	209/14
6/77	18590	18590	15	450	450	1.000	619.7	744/19	381/7
7/77	14256	16124	15	465	420	1.107	520.1	731/10	269/4
8/77	13970	14249	14	434	424	1.024	459.6	674/1	172/17
9/77	11904	12380	13	390	375	1.040	412.7	568/2	121/28
10/77	9676	9870	12	372	365	1.019	318.4	667/2	89/31
11/77	5580	6026	10	310	279	1.075	200.9	323/1	36/19
12/77	1328	-	10	310	81	-	-	229/5	75/3

TABLE A6.3.1-4 (Cont.)

Direct Solar Radiation

STATION AB23

MONTH/ YEAR	TOTAL LANG. FOR MONTH UNMOD.	MOD.*	AVG. DAY-LIGHT HRS/DAY	DAYLIGHT HRS PER MONTH	UPTIME DAYLIGHT HRS/MO.	CORR. FACTOR = 5 6	AVG. LANG/DAY (MOD.)	DAILY TOTAL/DATE HIGHEST	LOWEST
1	2	3 = 2 x 7	4	5	6	7	8/ (Days	9	10
1/78	1147	-	10	310	98	-	-	249/13	67/18
2/78	4508	8250	11	308	168	1.833	294.6	404/18	90/3
3/78	954	-	12	372	22	-	-	101/30	67/31
4/78	-	-	13	390	-	-	-	-	-
5/78	7587	-	14	434	183	-	-	714/12	5/21
6/78	-	-	15	450	-	-	-	-	-
7/78	1835	-	15	465	55	-	-	646/30	366/29
8/78	16327	16441	14	434	431	1.007	530.4	663/3	234/14
9/78	12107	12627	13	390	374	1.043	420.9	483/22	126/18
10/78	9957	9957	12	372	372	1.000	321.2	442/3	40/22
11/78	5480	5480	10	300	300	1.000	182.7	296/2	40/11
12/78	4635	4686	10	310	306	1.011	151.2	255/13	53/17
1/79	4454	4472	10	310	309	1.004	144.3	297/23	43/6
2/79	7718	7718	11	308	308	1.000	275.6	395/25	88/22
3/79	9749	11621	12	372		1.192	374.9	535/24	182/27
4/79	10990	15716	13	390	273	1.430	523.9	664/20	258/12
5/79	12498	15873	14	434	342	1.270	512.0	702/20	213/9
6/79	18374	18411	15	450	449	1.002	613.7	745/21	169/8
7/79	17557	17557	15	465	465	1.000	566.4	726/7	366/6
8/79	14743	14743	14	434	434	1.000	475.6	675/3	158/14
9/79	13519	13593	13	390	388	1.005	453.1	589/1	288/25
10/79	9769	9857	12	372	369	1.009	318.0	452/1	27/21
11/79	5756	6124	10	300	282	1.064	104.1	363/2	35/20
12/79	5680	5890	10	310	299	1.037	190.0	256/12	60/28
1/80	4851	5468	10	310	275	1.127	176.9	354/31	24/14
2/80	6583	6906	11	319	304	1.049	238.1	394/27	83/20
3/80	10275	10861	12	372	352	1.057	350.3	608/15	60/22
4/80	14256	14285	13	390	389	1.002	476.2	630/13	197/24
5/80	13984	15131	14	434	401	1.082	488.1	691/28	217/7
6/80	19591	19728	15	450	447	1.007	657.6	725/13	439/1
7/80	14706	16971	15	465	403	1.154	206.1	684/15	309/2
8/80	15417	15602	14	434	429	1.012	503.3	654/4	301/31
9/80	11689	11689	13	390	390	1.000	389.6	546/1	131/9
10/80	9629	9658	12	372	371	1.003	311.5	425/1&2	79/27
11/80	5066	5101	10	300	298	1.007	170.0	302/18	36/24
12/80	3638	3638	10	310	310	1.000	117.4	194/1	23/7

TABLE A6.3.1-5

RELATIVE HUMIDITY (%)

STA.	ITEM	SEASONAL YEAR	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	ANN. MAX. AVG. MIN.
AB23	HOURLY MAX.	1975	100	100	100	100	100	100	100	100	87	93	100	100	100
AB23	HOURLY AVG.	1975	69	68	72	72	67	64	54	54	29	35	40	53	56
AB23	HOURLY MIN.	1975	25	26	32	37	32	28	25	28	12	16	15	19	12
AB23	HOURLY MAX.	1976	90	90	89	90	98	90	99	96	100	99	94	97	100
AB23	HOURLY AVG.	1976	62	62	57	56	53	51	44	47	50	59	51	56	54
AB23	HOURLY MIN.	1976	34	25	22	23	21	24	27	29	32	32	32	32	21
AB23	HOURLY MAX.	1977	96(1)	(2)	(2)	74(1)	100	(2)	(2)	(2)	(2)	99(1)	(2)	(2)	(1)
AB23	HOURLY AVG.	1977	58(1)	(2)	(2)	56(1)	67	(2)	(2)	(2)	(2)	37(1)	(2)	(2)	(1)
AB23	HOURLY MIN.	1977	30(1)	(2)	(2)	41(1)	37	(2)	(2)	(2)	(2)	15(1)	(2)	(2)	(1)
AB23	HOURLY MAX.	1978	99	97	96	96	95	94	96	94	94	97	97	99	99
AB23	HOURLY AVG.	1978	65	74	71	66	53	49	42	38	38	45	44	62	54
AB23	HOURLY MIN.	1978	10	32	25	20	14	13	12	9	9	8	12	19	8
AB23	HOURLY MAX.	1979	99	100	99	100	100	100	90	100	100	100	100		100
AB23	HOURLY AVG.	1979	74	75	70	73	< 75%	< 75%	43	49	55	41	55		
AB23	HOURLY MIN.	1979	31	37	32	30	24	24	16	15	15	15	11		11
AB23	HOURLY MAX.	1980	96	96	95	99	98	98	90	93	94	93	94	98	
AB23	HOURLY AVG.	1980	57	<75	67	66	53	61	32	42	39	42	52	58	
AB23	HOURLY MIN.	1980	17	27	18	22	14	11	12	8	8	8	7	13	

(1) Partial Data Only
(2) Instrument Malfunction

( ) = Estimate

TABLE A6.3.1-6A

MONTHLY PRECIPITATION FOR 1975

STATION	COMPUTER CODE	MONTHLY TOTAL (cm) JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN. TOTAL (EST.)
USGS 015	WU15	(5.16)	1.27	1.22	2.54	2.57	5.18	2.36	0.30	0.66	2.79	2.79	2.03	28.87
USGS 022	WU22		2.54	2.74	0.71			1.65	2.87	1.22	2.54			
USGS 050	WU50		1.27	1.52	1.65	0.28	0.00	1.27	0.51	0.97	1.65	1.78	2.01	
USGS 058	WU58								1.65	1.09	2.29			
USGS 070	WU70	5.74	4.01	6.78	5.21	(3.76)	(5.76)	2.54	0.43	1.02	4.85	4.95	4.01	49.06
MC Station 1	BC01							1.80	1.00	0.08	0.43	0.76	1.15	
MC Station 2	BC02	(3.48)	(2.32)	(4.17)	(3.12)	(2.16)	2.18	1.30	1.09	0.13	0.10	2.49	1.09	23.63
MC Station 3	BC03	(3.79)	(2.40)	(4.63)	(3.36)	(2.21)	(3.83)	1.80	0.79	0.20	0.41	1.42	1.35	26.19
MC Station 4	BC04	(4.29)	(2.79)	(5.19)	(3.83)	2.62	2.49	0.61	0.41	1.19	0.46	1.27	1.14	26.29
MC Station 5	BC05	(1.34)	(0.98)	(1.55)	(1.23)	2.59	4.62	2.49	0.99	0.36	0.51	1.14	1.52	19.32
MC Station 6	BC06					3.40	6.99	2.40	0.70	0.61	0.48	3.07	1.37	
MC Station 7	BC07					0.53	3.28	4.60	0.40	0.00				
MC Station 8	BC08					0.64	1.52	3.20		0.00	0.00	0.00		
MC Station 9	BC09						3.05	1.00	3.40	0.86	0.43	0.97	1.50	
MC Station 13	BC13					5.59	3.30	3.10	4.30	0.03	0.66	1.50	1.65	
AQ Station 020	AB20	(7.09)	(4.49)	(8.65)	(6.29)	(3.68)	(5.92)	(2.28)	(0.00)	(0.00)	(5.75)	(5.90)	(4.49)	54.54
AQ Station 023	AB23	(5.54)	(3.63)	(6.69)	(4.95)	(3.37)	(5.59)	(2.00)	(0.00)	(0.32)	(4.56)	(4.67)	(3.63)	44.95
Little Hills	WR01	2.03	1.27	3.10	4.01	5.92	4.45	7.62	0.91	1.83	3.94	1.91	1.98	38.96
Meeker 2	WR02	1.57	0.86	3.15	4.47	4.17	4.37	5.18	1.12	1.22	3.30	1.19	1.70	32.31
Scandard Gulch on Roan Plateau	WR03	5.74	4.01	6.78	5.21			2.54	0.43	1.02	4.85	4.95	4.01	
Corral Gulch	WR04													
JQS Gage	WR05													
East Fork Parachute Creek	WR06													
East Middle Fork Parachute Creek	WR07													

( ) = Estimate

TABLE A6.3.1-6B

MONTHLY PRECIPITATION FOR 1976

STATION	COMPUTER CODE	MONTHLY TOTAL (cm)												ANN. TOTAL (EST.)
		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	
USGS 015	WU15	(0.00)	4.06	4.29	1.78	3.05	2.01	2.92	0.13	2.46	(0.00)	0.10	0.00	20.80
USGS 022	WU22				1.98	4.06	2.01	4.24	2.26	2.79	0.51			
USGS 050	WU50		4.32	4.32	1.65	3.48	1.60	2.41	0.00	2.03	0.13	0.00	0.00	
USGS 058	WU58						2.90	4.09	1.12					
USGS 070	WU70	1.47	8.71	5.82	(3.15)	(4.13)	(3.33)	4.62	1.68	4.29	1.47	0.79	0.84	40.30
MC Station 1	BC01	3.90		4.10		0.79	0.97	0.00	1.30		0.66			
MC Station 2	BC02	4.29	3.10	3.20	(1.75)	0.97	0.91	0.20	0.71	(2.50)	2.87	0.43	(0.72)	21.65
MC Station 3	BC03	3.40	(6.18)	4.60	(1.72)	1.52	1.80	0.00	0.76	(2.63)	0.00	(0.00)	(0.48)	23.09
MC Station 4	BC04	4.14	4.60	9.22	4.90	6.30	1.63	1.63	1.30	(3.03)	(0.58)	(0.00)	0.00	37.33
MC Station 5	BC05	2.29	2.49	0.00	0.00	(1.01)	1.88	0.36	1.47	0.79	0.00	(0.33)	0.00	10.62
MC Station 6	BC06	2.20	0.99	2.63	0.79	1.68	2.29	3.56	0.56	0.91	2.14			
MC Station 7	BC07	2.20	1.41						1.78	0.72		0.86		
MC Station 8	BC08	1.10	0.64	2.40	2.16	0.91	1.57	1.32	1.55					
MC Station 9	BC09	2.00	4.19	2.90		2.01	0.74	0.25	1.73					
MC Station 13	BC13	3.10	2.59	4.80		1.19	1.37	0.25	1.73					
AQ Station 020	AB20	(0.68)	(11.55)	(7.21)	(2.99)	(4.09)	(3.19)	(5.41)	(0.99)	(4.91)	(0.68)	(0.00)	(0.74)	42.44
AQ Station 023	AB23	(0.81)	(8.83)	(5.63)	(2.69)	(3.78)	(2.89)	(4.30)	(1.05)	(3.94)	(0.81)	(0.06)	(0.99)	35.78
Little Hills	WR01	1.19	1.88	4.19	3.05	4.98	4.06	2.74	4.55	3.07	1.37	0.25	0.25	31.58
Meeker 2	WR02	1.19	1.88	3.48	3.18	3.66	3.63	5.16	3.00	2.90	0.94	0.28	0.43	29.73
Scandard Gulch on Roan Plateau	WR03	1.47	8.71	5.82				4.62	1.68	4.29	1.47	0.79	0.84	
Corral Gulch	WR04													
JOS Gage	WR05													
East Fork Parachute Creek	WR06													
East Middle Fork Parachute Creek	WR07													

( ) = Estimate

TABLE A6.3.1-6C

MONTHLY PRECIPITATION FOR 1977

STATION	COMPUTER CODE	MONTHLY TOTAL (cm)												ANN. TOTAL (EST.)
		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	
USGS 015	WU15	1.09	0.38	2.90	0.53	1.85	0.08	5.05	5.18	3.40	2.84	4.22	(1.94)	29.46
USGS 022	WU22				1.30	2.03	0.28	6.05	6.50	5.84	2.84	1.37		
USGS 050	WU50	1.09	0.30	2.18	1.70	2.34	0.25	4.17	5.36	2.83	1.32	4.29	2.74	28.57
USGS 058	WU58					2.36	0.51	1.68	6.15	5.14	1.55			
USGS 070	WU70	1.98	1.70	7.39	(3.61)	3.40	0.28	1.52	6.05	3.71	2.36	4.98	3.28	40.26
MC Station 1	BC01										4.32	0.86		
MC Station 2	BC02	(1.35)	(0.84)	(2.69)	(2.03)	(1.56)	(0.35)	(2.49)	(3.26)	(5.74)	2.16	0.36	(2.20)	25.03
MC Station 3	BC03	(1.24)	(0.74)	(2.68)	(2.07)	(1.79)	(0.06)	(3.18)	(3.88)	(2.47)	1.91	0.56	(1.33)	21.91
MC Station 4	BC04	0.05	0.03	0.05	0.15	0.03	0.03	17.81	(4.38)	(2.87)	4.70	1.02	(1.64)	32.76
MC Station 5	BC05	0.05	0.03	0.05	0.13	0.10	0.03	(1.18)	(1.36)	(1.00)	2.79	0.74	(0.71)	8.17
MC Station 6	BC06	0.12	0.00	0.03	0.09	0.08	0.00	8.72			3.91	0.97		
MC Station 7	BC07	0.00	0.00	0.00	0.38	0.25					1.52	0.66		
MC Station 8	BC08										4.44	0.63		
MC Station 9	BC09										1.47	0.46		
MC Station 13	BC13										4.01	1.14		
AQ Station 020	AB20	2.31	1.19	4.24	3.15	2.39	0.38	3.91	5.18	9.27	2.57	4.37	3.43	42.39
AQ Station 023	AB23	2.03	1.35	4.01	3.18	2.79	0.41	4.70	5.66	3.73	2.24	3.66	2.16	35.92
Little Hills	WR01	0.66	1.12	2.41	2.21	1.80	0.74	3.02	5.74	2.31	3.10	3.18	1.78	28.07
Meeker 2	WR02	0.94	1.24	1.88	1.78	2.82	0.64	4.47	7.72	1.68	2.08	1.88	1.60	28.73
Scandard Gulch on Roan Plateau	WR03	1.98	1.70	7.39		3.40	0.28	1.52	6.05	3.71	2.36	4.98	3.28	
Corral Gulch	WR04													
JQS Gage	WR05													
East Fork Parachute Creek	WR06													
East Middle Fork Parachute Creek	WR07													

TABLE A6.3.1-6D

MONTHLY PRECIPITATION FOR 1978

( ) = Estimate

STATION	COMPUTER CODE	MONTHLY TOTAL (cm) JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	ANN. TOTAL (EST.)
USGS 015	WU15	2.67	2.08	7.37	0.00	1.57	0.05	1.78	0.79	3.23	0.00	4.83	(5.35)	29.72
USGS 022	WU22						0.00	1.40	0.53	1.02				
USGS 050	WU50	1.93	1.57	5.79	0.00	1.68	0.05	2.77	0.64	1.27	0.00	3.89		
USGS 058	WU58						0.71	0.43	0.46					
USGS 070	WU70	4.88	(2.42)	(6.43)	3.51	3.38	1.03	3.22	1.50	0.97	0.86	7.90	5.89	41.99
MC Station 1	BC01	6.60	6.60	(6.99)	2.01	3.02	0.58	1.22	0.87	1.45	0.48	4.27		
MC Station 2	BC02	6.86	6.86	8.20	1.71	2.34	1.50	2.57	0.94	1.52	0.43	5.41	(3.59)	41.93
MC Station 3	BC03	6.86	6.86	9.15	1.75	3.18	0.71	1.83	1.27	1.20	0.23	5.23	(3.93)	42.20
MC Station 4	BC04	6.60	6.60	8.31	1.93	3.00	0.92	2.06	1.12	1.35	0.35	4.87	(4.44)	41.55
MC Station 5	BC05	6.60	6.60	(6.73)	1.25	3.05	0.56	0.33	0.36	1.24	0.48	5.51	(1.37)	34.08
MC Station 6	BC06			10.09	1.93	2.69	0.73	0.66	1.20	1.53	0.18	7.62		
MC Station 7	BC07	6.86	6.86	7.77	1.58	3.15	0.81	1.71	1.05	1.62	0.76	4.16		
MC Station 8	BC08	6.98		6.86	1.81	2.74	1.93	0.38	0.99	1.22	1.63	4.62		
MC Station 9	BC09	7.62		8.38	1.65	2.49	1.45	0.41	1.12	(1.32)	0.66	4.55		
MC Station 13	BC13			9.57	2.01	3.54	0.82	1.43	1.47	1.62	0.45	(3.94)		
AQ Station 020	AB20	3.02	2.11	8.13	(2.59)	3.99	2.57	2.18	2.36	1.83	0.58	4.83	(6.06)	40.25
AQ Station 023	AB23	1.65	2.64	8.36	2.29	3.94	1.30	1.98	(2.07)	1.40	0.20	(4.51)	(5.73)	36.07
Little Hills	WR01	2.95	1.78	5.11	5.54	3.56	0.71	1.93	1.24	2.49	0.51	4.27	3.76	33.85
Meeker 2	WR02	3.76	2.41	5.16	3.51	2.87	2.41	0.97	1.55	5.23	0.30	5.16	2.90	36.22
Scandard Gulch on Roan Plateau	WR03	4.88			3.51	3.38	1.03	3.22	1.50	0.97	0.86	7.90	5.89	
Corral Gulch	WR04													
JQS Gage	WR05													
East Fork Parachute Creek	WR06													
East Middle Fork Parachute Creek	WR07													

TABLE A6.3.1-6E

MONTHLY PRECIPITATION FOR 1979

( ) = Estimate

STATION	COMPUTER CODE	MONTHLY TOTAL (cm)												ANN. TOTAL (EST.)
		JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	
USGS 015	WU15			14.73		7.26	1.96		1.30	2.15				
USGS 022	WU22					1.17	0.00	1.42	1.42	0.20	0.30			
USGS 050	WU50					6.30	0.00	0.00	3.25	0.76				
USGS 058	WU58						1.65	1.02	1.57	0.61	3.35			
USGS 070	WU70	3.81	(2.54)	(3.98)	(3.13)	(6.16)	(1.77)	(2.65)	(2.66)	(1.70)	(5.03)	(5.43)	(1.73)	40.59
MC Station 1	BC01				1.73	1.02	0.48	0.03	0.30	0.28				
MC Station 2	BC02	(1.76)	(1.07)	(2.44)	0.56	3.18	0.74	0.43	1.68	0.33	(2.94)	(3.35)	(0.81)	19.29
MC Station 3	BC03	(1.74)	(0.90)	(2.55)	1.30	3.30	0.81	0.53	0.71	0.41	(3.14)	(3.64)	(0.59)	19.62
MC Station 4	BC04	(2.08)	(1.18)	(2.96)	1.24	0.99	0.71	0.53	1.24	0.38	(3.59)	(4.12)	(0.84)	19.86
MC Station 5	BC05	(0.82)	(0.61)	(1.02)	0.79	1.73	0.74	0.41	0.61	0.10	(1.17)	(1.30)	(0.53)	9.83
MC Station 6	BC06				1.22	3.56	1.12	1.45	1.42	0.48				
MC Station 7	BC07				1.27	2.67	0.97	(0.05)	1.65	0.25				
MC Station 8	BC08				(1.17)		0.41	(0.13)		0.05				
MC Station 9	BC09				1.32	4.45	0.71	0.28	(0.00)	(0.05)				
MC Station 13	BC13				(0.00)	(5.46)	1.12	0.81	1.07	0.64				
AQ Station 020	AB20	(3.02)	2.29	4.44	3.17	7.72	1.12	(2.45)	(2.47)	1.02	6.02	6.63	1.07	41.42
AQ Station 023	AB23	2.72	1.57	3.84	2.97	8.48	0.97	2.16	2.18	0.71	4.65	5.33	1.14	36.72
Little Hills	WR01	2.36	1.55	6.22	2.59	6.43	0.81	0.71	3.30	0.64	3.96			
Meeker 2	WR02	1.80	2.03	4.67	2.62	6.81	0.94	1.98	2.77	1.27	3.07			
Scandard Gulch on Roan Plateau	WR03	3.81		7.70		3.12	0.00			1.19	5.92	4.47		
Corral Gulch	WR04	3.05	2.41	6.68	4.27	6.88	1.07	1.75	1.55	1.22	5.74	4.75		
JQS Gage	WR05	1.96	3.88			10.26	1.55	1.04	4.52	1.24	1.40	2.64	1.42	
East Fork Parachute Creek	WR06	1.70				1.73	1.35	1.40	3.12	0.25	3.05	5.11	0.89	
East Middle Fork Parachute Creek	WR07									2.44	2.92			

TABLE A6.3.1-7

Evaporation (cm) @ Station AB23

1978

	MONTH				
	May	June	July	August	September
# Sample Days →	20	30	31	31	30
PAN					
Monthly Total	11.24	21.54	25.08	23.14	16.29
Daily Average	0.56	0.72	0.81	0.75	0.54
LAKE[1]					
Monthly Total	7.87	15.08	17.56	16.20	11.40
Daily Average	0.39	0.50	0.57	0.52	0.38

1979

	MONTH				
	May	June	July	August	September
# Sample Days →	18	25	29	31	26
PAN					
Monthly Total	6.49	20.37	17.94	17.12	13.58
Daily Average	0.37	0.81	0.62	0.55	0.52
LAKE[1]					
Monthly Total	4.54	14.26	12.56	11.98	9.51
Daily Average	0.25	0.57	0.43	0.39	0.37

1980

	MONTH[2]	
	September	October
# Sample Days →	20	9
PAN		
Monthly Total	3.57	3.21
Daily Average	0.18	0.36
LAKE[1]		
Monthly Total	2.50	2.25
Daily Average	0.12	0.25

[1] Assumes a pan coefficient of 0.7

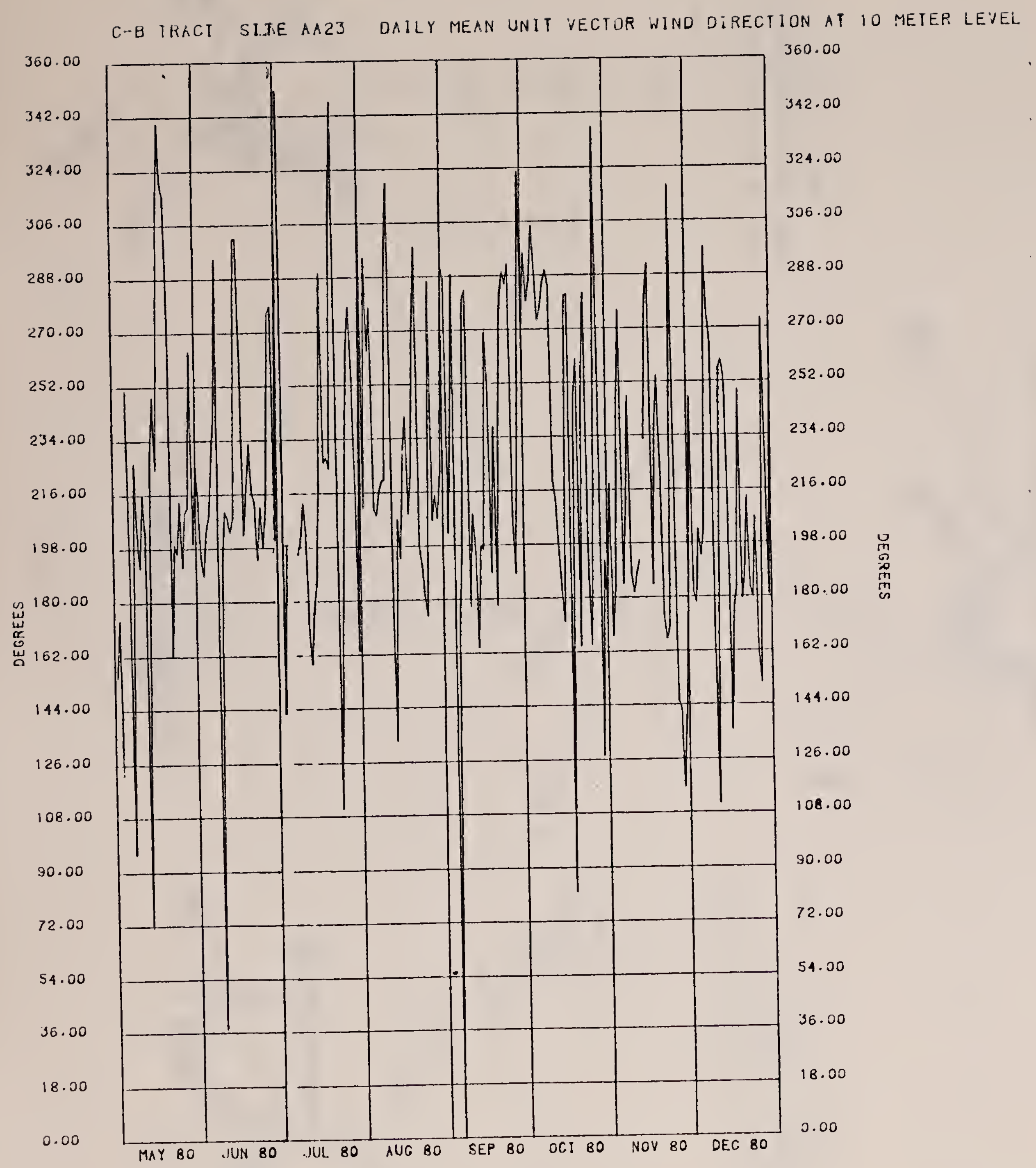
[2] Not sampled previous to September.

TABLE A6.3.1-8

BAROMETRIC PRESSURE, MILLIBARS (DAILY EXTREMA)

STA.	ITEMS	SEASONAL YEAR	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	ANN. MAX. AVG. MIN.
AB24	DAILY MAX.	1975						795	796	799	798	803	802	803	803(1)
AB23	" "	1975		795	794(1)	790	790	792	793	794	794	799	798	800	800
AB24	DAILY AVG.	1975						790(1)	791(1)	795	796	797	794	793(1)	
AB23	" "	1975		786	785	782(1)	782	786	778(1)	791	792	794	791	789	787(1)
AB24	DAILY MIN.	1975						776	781	792	792	792	782	772	772(1)
AB23	" "	1975		770	777	769	771	773	778	788	789	789	782	770	770
AB24	DAILY MAX.	1976	802	802	804	796	799	798	799	799	801	803	800	(3)	804
AB23	" "	1976	798	799	799	793	790	795	795	796	797	799	797	798	799
AB24	DAILY AVG.	1976	794	795	791	788	789	793(1)	793	796(1)	797	796	795	(3)	
AB23	" "	1976	791	791	788	785	786(1)	790(1)	790	792(1)	793	793	792	792	790
AB24	DAILY MIN.	1976	776	785	778	778	776	787	787	791	792	790	789	(3)	776
AB23	" "	1976	780	781	775	775	781	784(1)	784	789	787	787	786	777	775
AB23	DAILY MAX.	1977	798	797	797	793	796	795	795	797	796	(2)	(2)	(2)	798(1)
AB23	DAILY AVG.	1977	790	788	790	784	789	786	791	794	794	(2)	(2)	(2)	790(1)
AB23	DAILY MIN.	1977	779	773	774	771	775	776	786	789	789	(2)	(2)	(2)	771(1)
AB23	DAILY MAX.	1978	(2)	794(1)	798	797	792	795	795	793	796	792	792	792	797(1)
AB23	DAILY AVG.	1978	(2)	783(1)	785	786	784	784	789	787	789	785	786	783	786(1)
AB23	DAILY MIN.	1978	(2)	768(1)	771	775	776	773	782	773	776	770	776	773	768(1)
AB23	DAILY MAX.	1979	794	792	793	793	789	791	795	794	793	793	794		795(1)
AB23	DAILY AVG.	1979	781	781	783	783	782	784	787	787	788	789	786		
AB23	DAILY MIN.	1979	766	770	771	772	766	771	776	725	783	784	773		725(1)
AB23	DAILY MAX.	1980		792	793	790	793	789	792	793	792	793	795	795	
AB23	DAILY AVG.	1980		782	784	780	785	783	786	789	786	788	788	786	
AB23	DAILY MIN.	1980		766	771	773	774	773	779	784	780	781	759	775	

(1) Partial Data Only
(2) Instrument Malfunction
(3) Station Inoperative



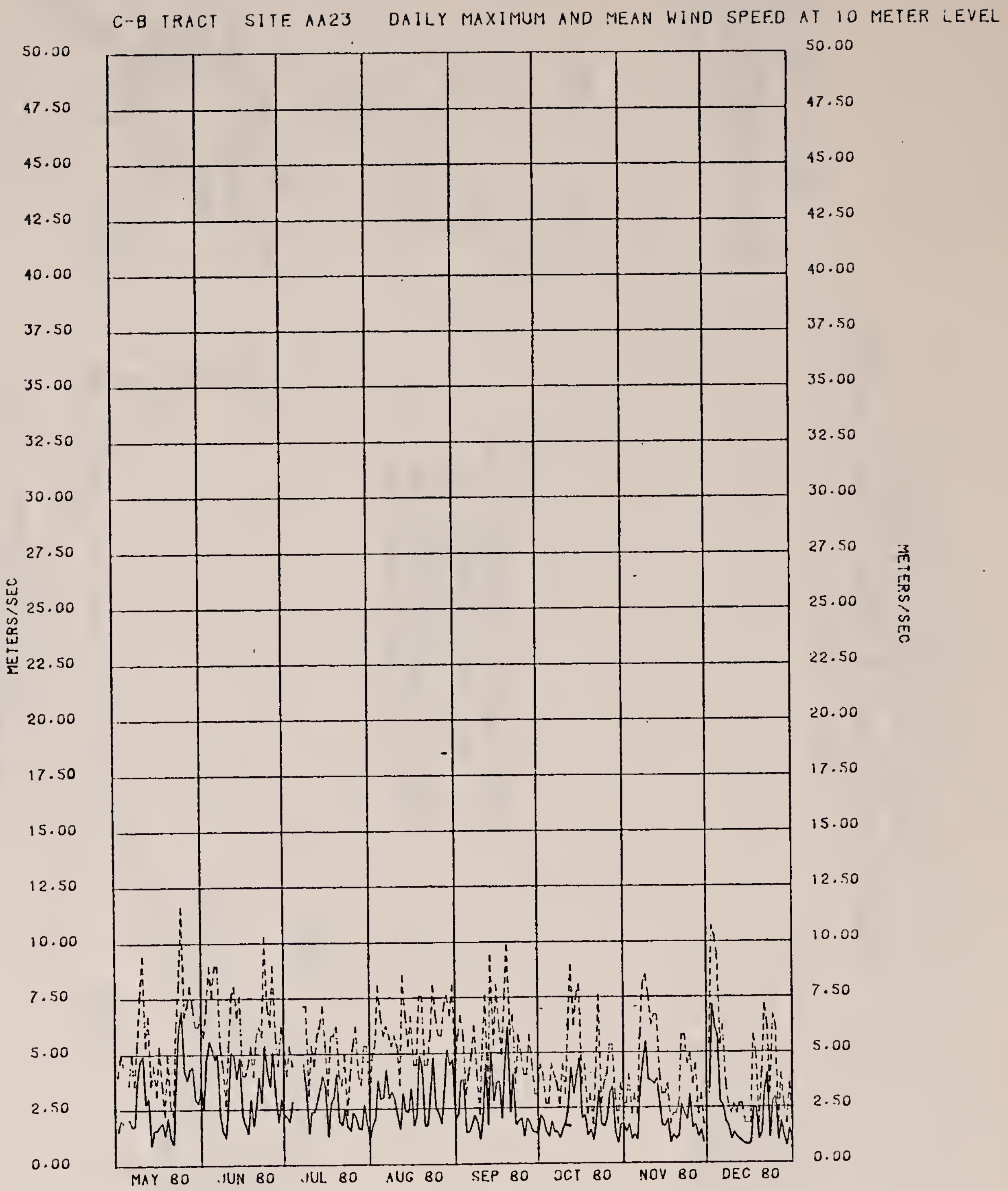


FIGURE A6.3.2-1

FIGURE A6.3.2-2
AB20 AT 10M LEVEL
QUARTERLY AND ANNUAL WIND ROSES
1978 - 1979

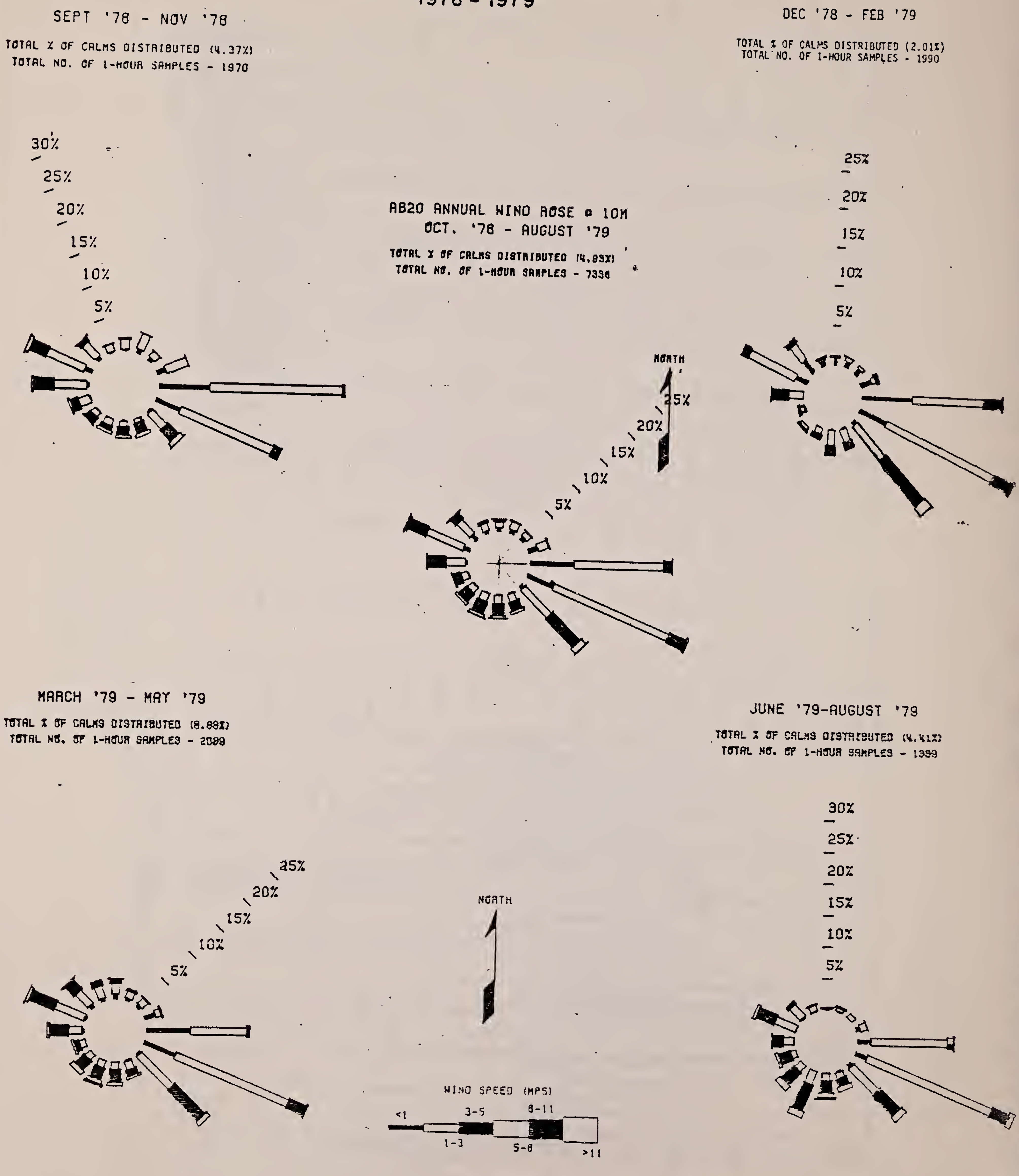


FIGURE A6.3.2-3

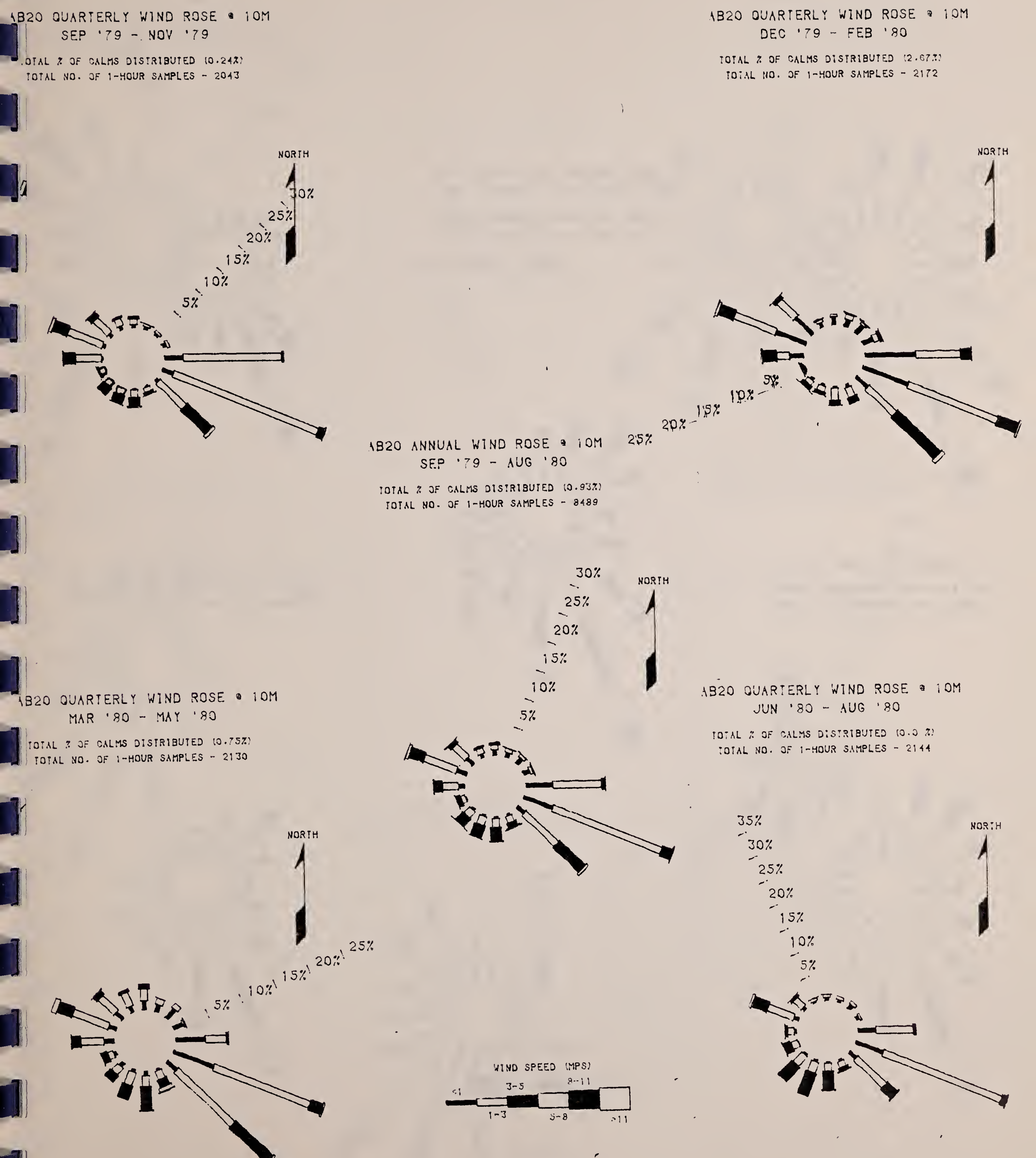


FIGURE A6.3.2-4

AA23 AT 10M LEVEL

QUARTERLY AND ANNUAL WIND ROSES

1978 — 1979

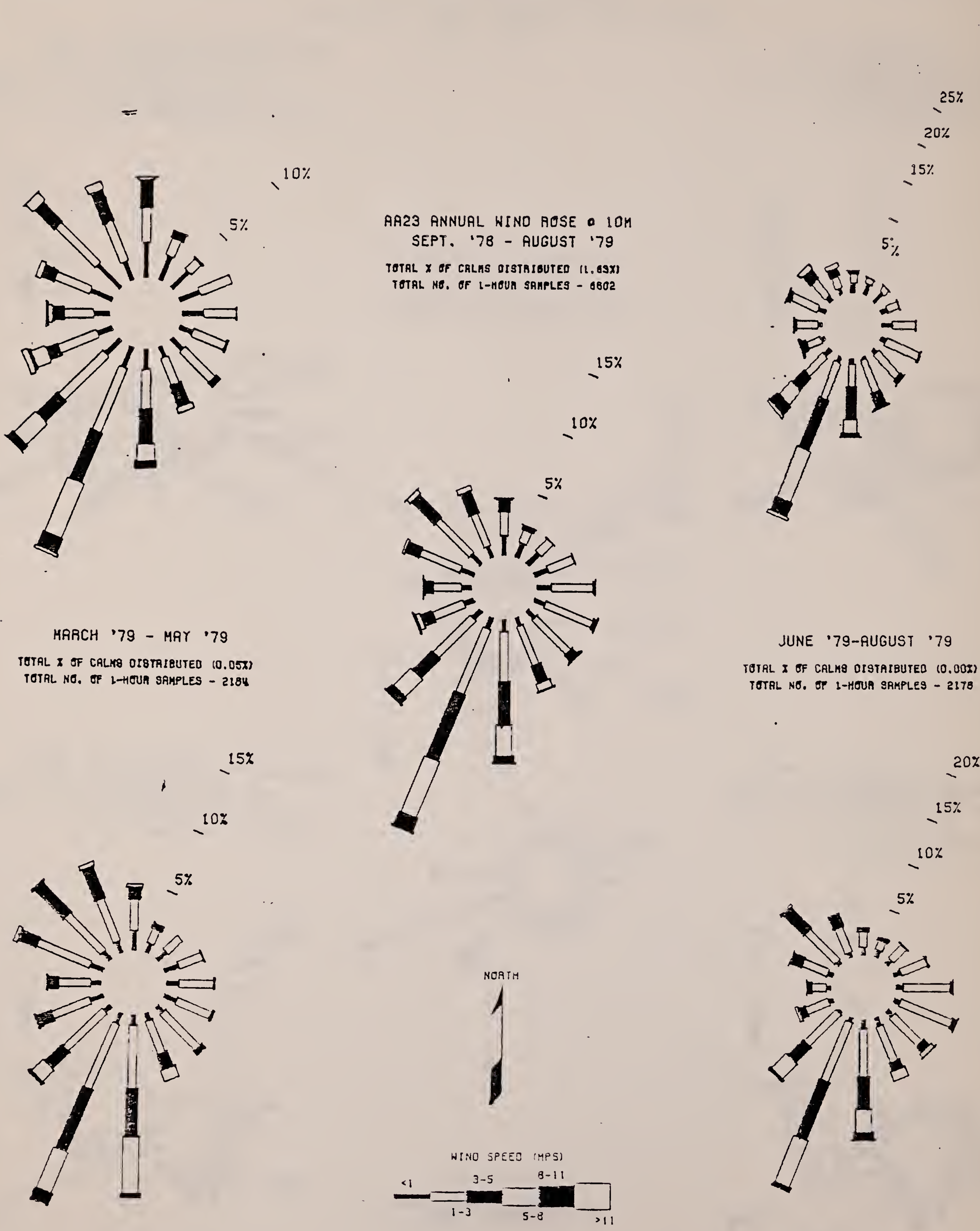


FIGURE A6.3.2-5

AA23 QUARTERLY WIND ROSE @ 10M

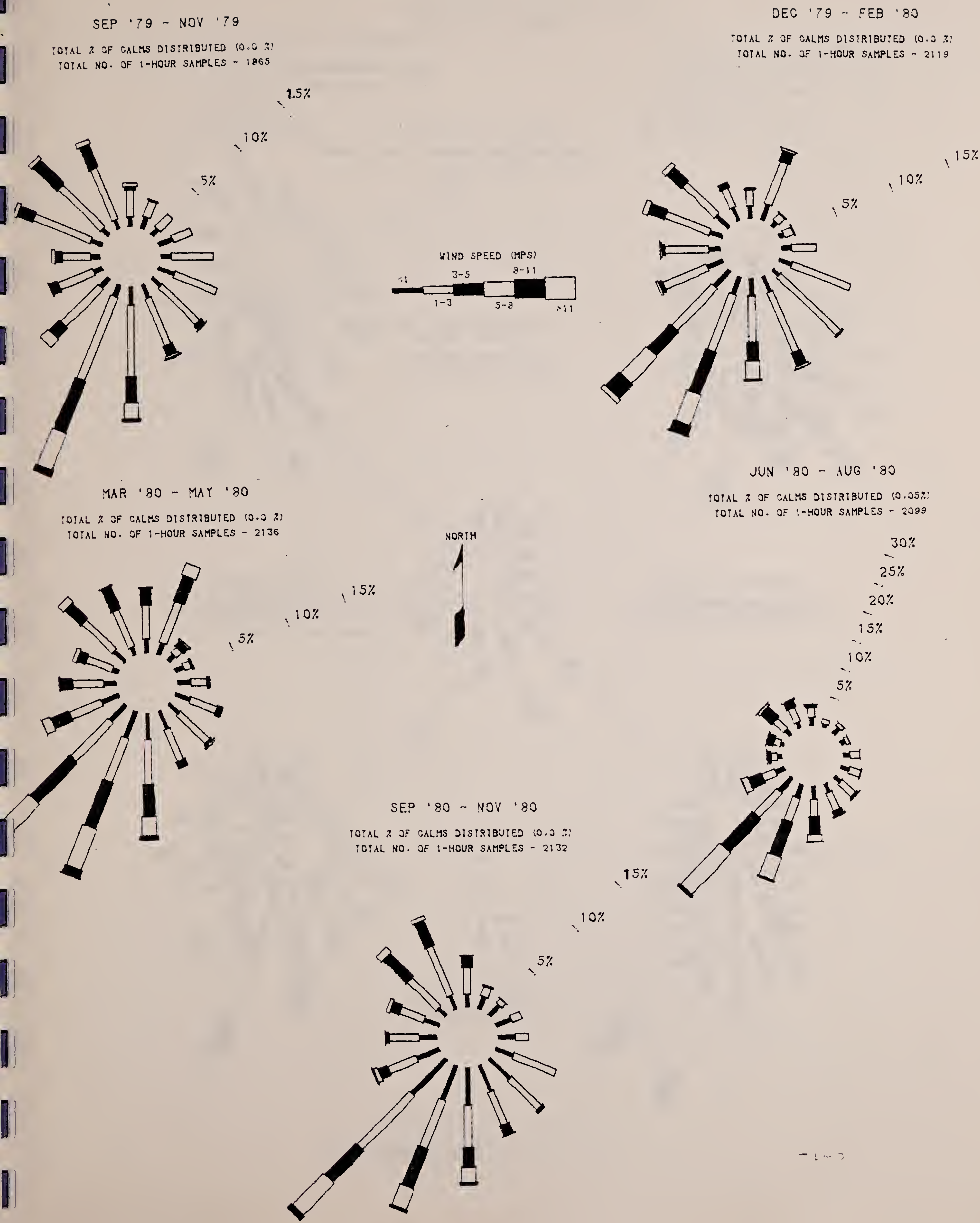


FIGURE A6.3.2-6

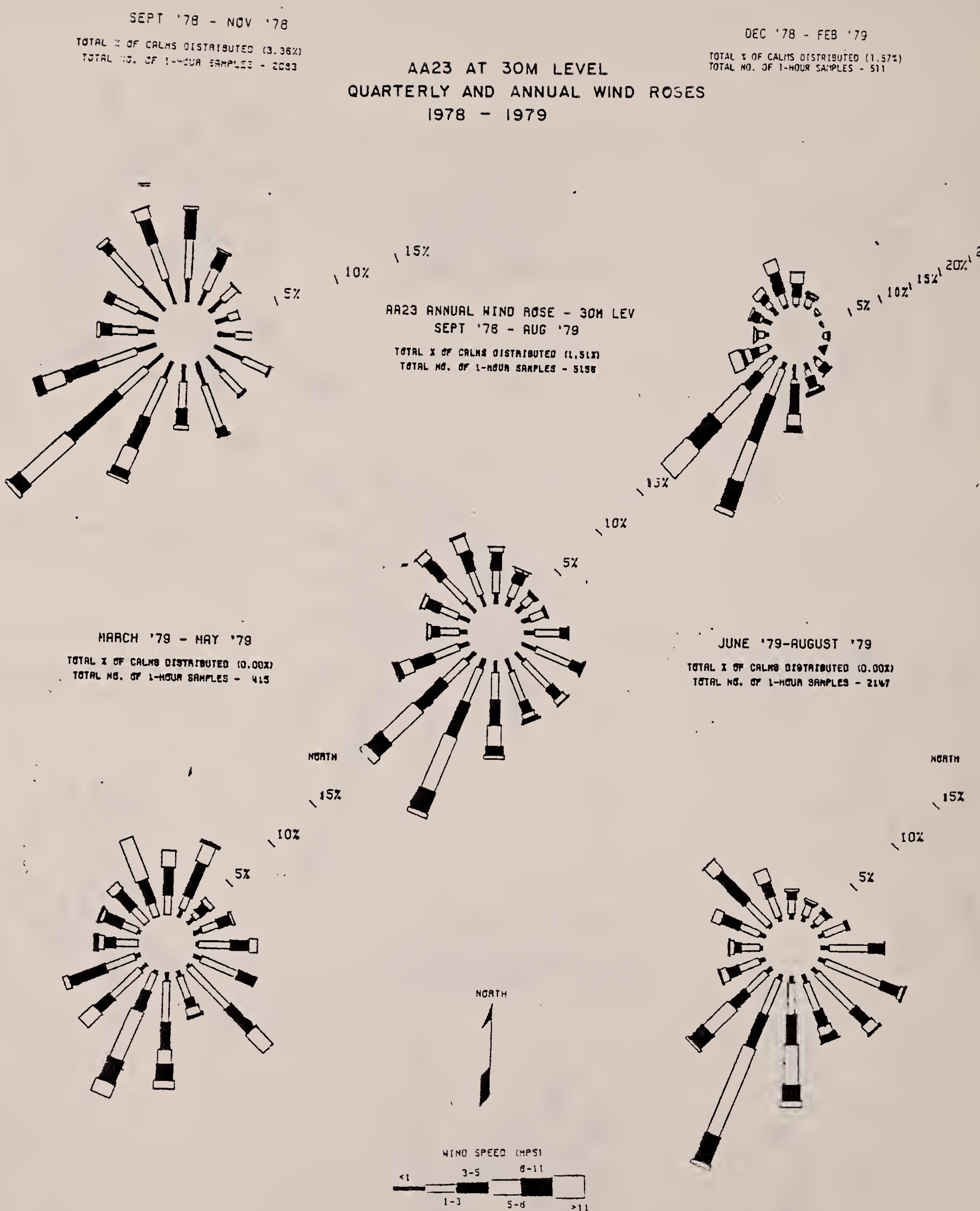


FIGURE A6.3.2-7

AA23 QUARTERLY WIND ROSE @ 30M

SEPTEMBER '79 - NOVEMBER '79

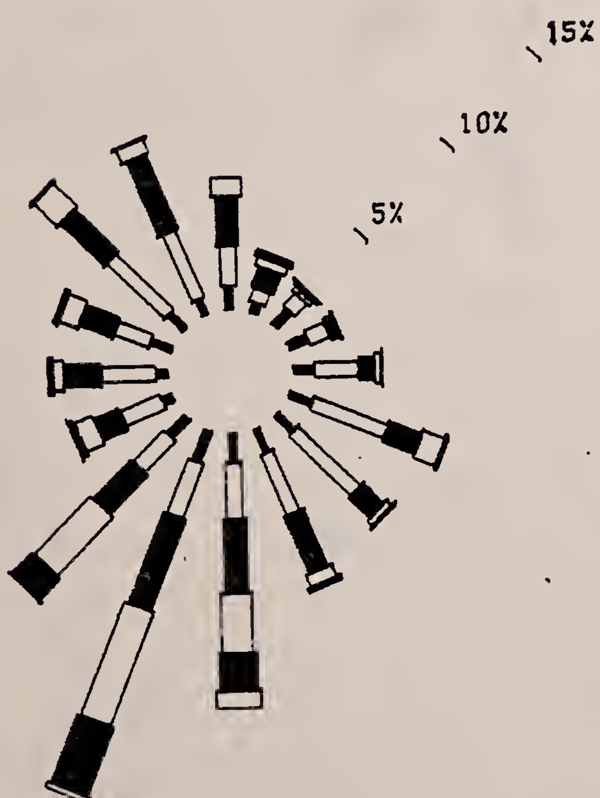
TOTAL % OF CALMS DISTRIBUTED (0.00%)
TOTAL NO. OF 1-HOUR SAMPLES - 1604

DECEMBER '79 - FEBRUARY '80

TOTAL % OF CALMS DISTRIBUTED (0.72%)
TOTAL NO. OF 1-HOUR SAMPLES - 1852

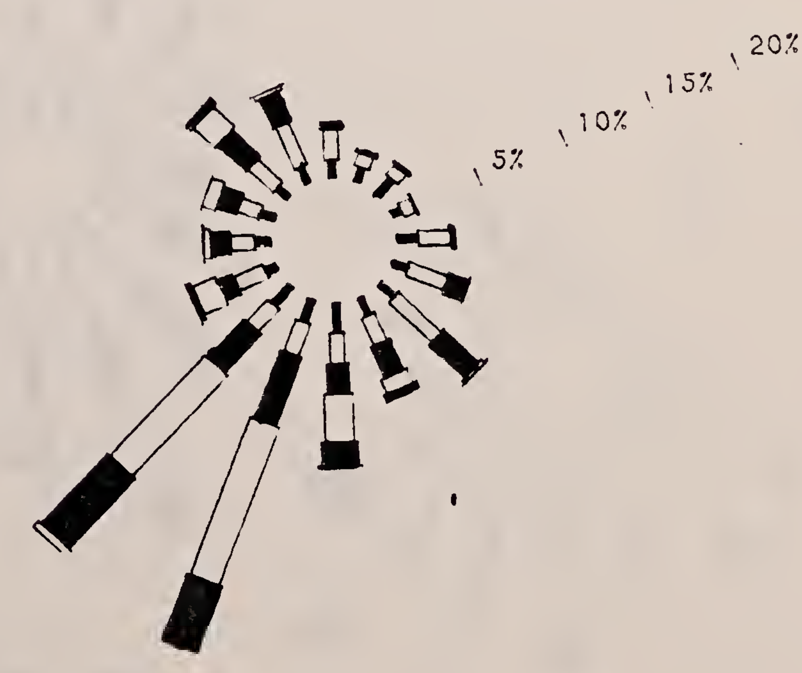
MARCH '80 - MAY '80

TOTAL % OF CALMS DISTRIBUTED (0.00%)
TOTAL NO. OF 1-HOUR SAMPLES - 2126



JUNE '80 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.05%)
TOTAL NO. OF 1-HOUR SAMPLES - 2098



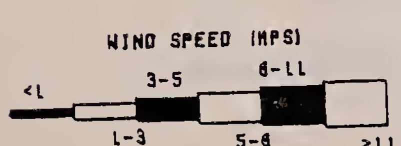
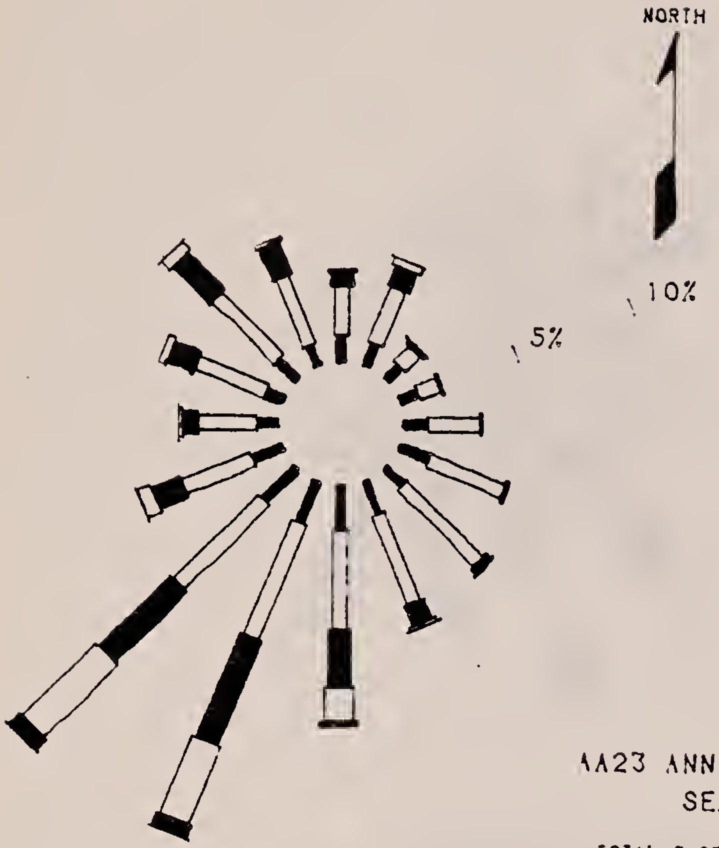


FIGURE A6.3.2-8

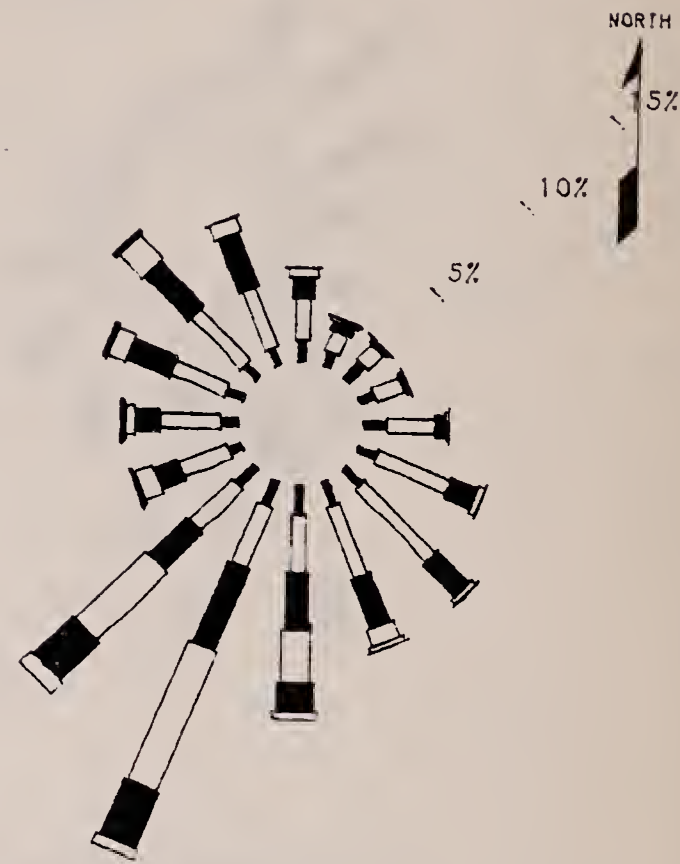
AA23 ANNUAL WIND ROSE @ 10M
SEP '79 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.31%)
TOTAL NO. OF 1-HOUR SAMPLES - 8219



AA23 ANNUAL WIND ROSE @ 30M
SEP '79 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.19%)
TOTAL NO. OF 1-HOUR SAMPLES - 7982



AA23 ANNUAL WIND ROSE @ 60M
SEP '79 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 8233

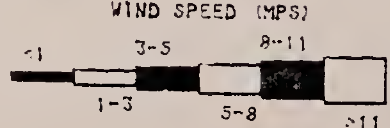


FIGURE A6.3.2-9

AA23 AT 60M LEVEL

QUARTERLY AND ANNUAL WIND ROSES

1978 – 1979

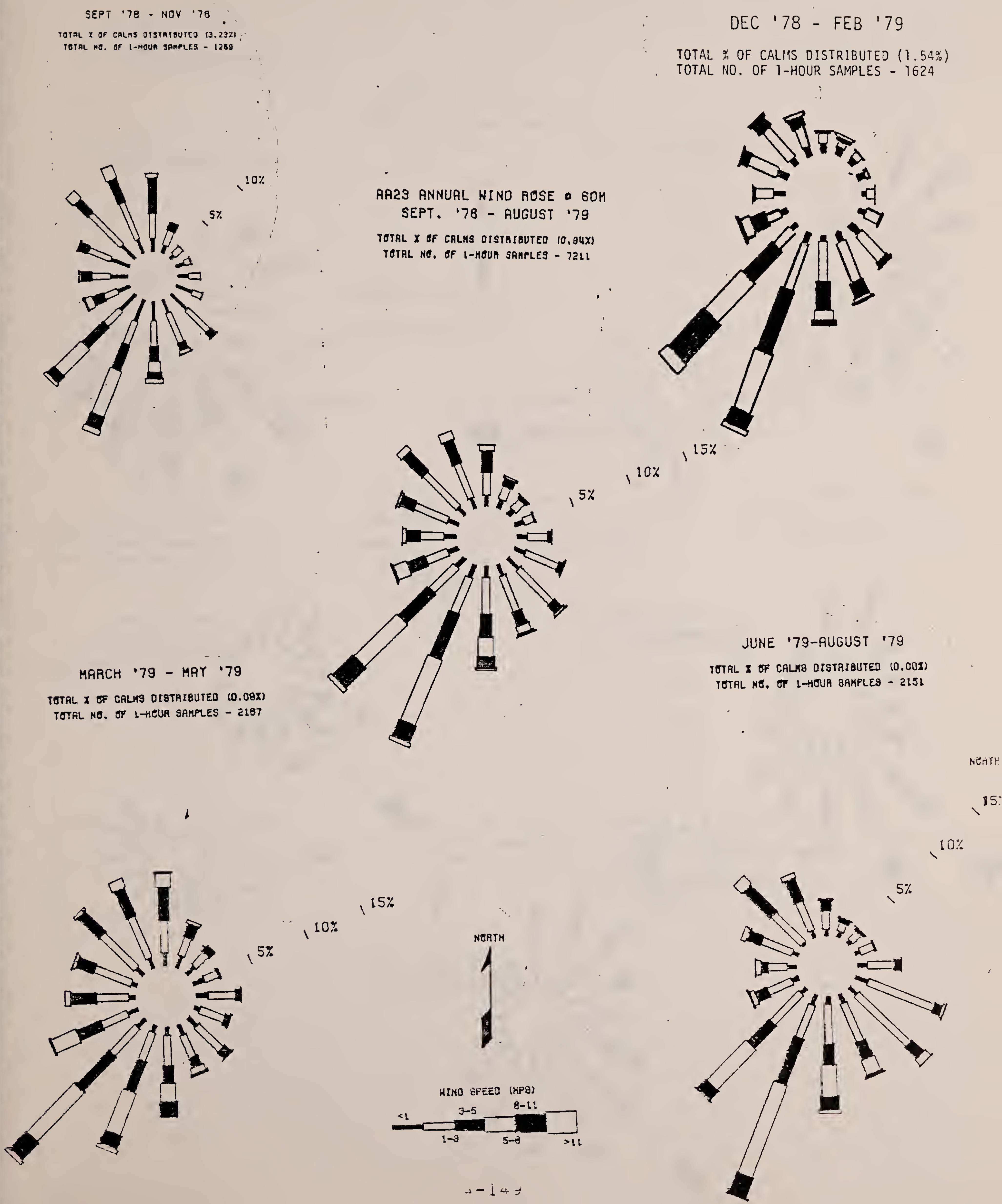


FIGURE A6.3.2-10

AA23 QUARTERLY WIND ROSE @ 60M

SEP '79 - NOV '79

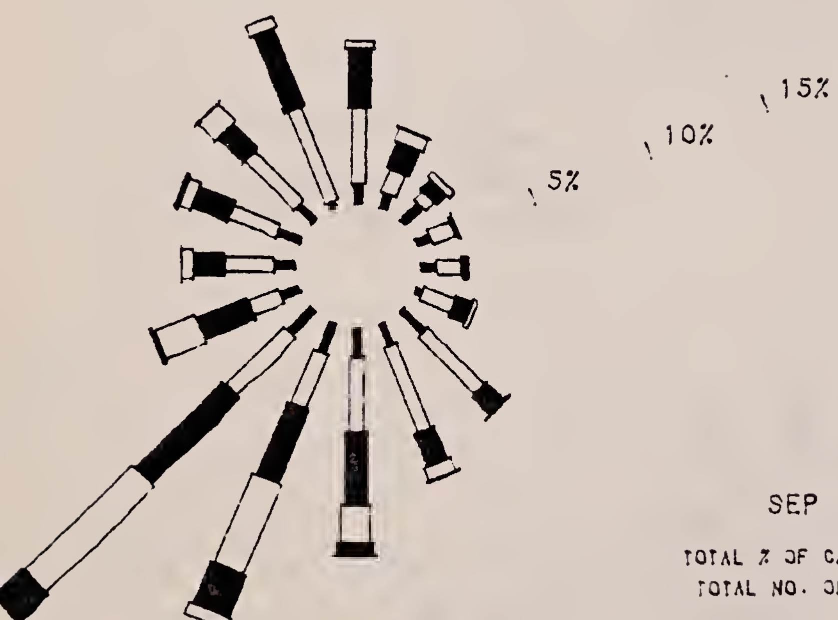
TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 1893

DEC '79 - FEB '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 2105

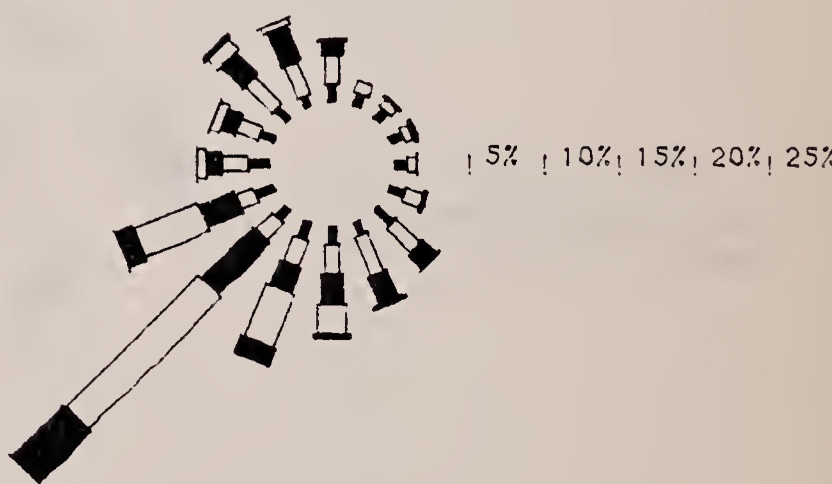
MAR '80 - MAY '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 2136



JUN '80 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 2099



SEP '80 - NOV '80

TOTAL % OF CALMS DISTRIBUTED (0.20%)
TOTAL NO. OF 1-HOUR SAMPLES - 2036

FIGURE A6.3.2-11

AD42 AT 10M LEVEL
QUARTERLY AND ANNUAL WIND ROSES
1978—1979

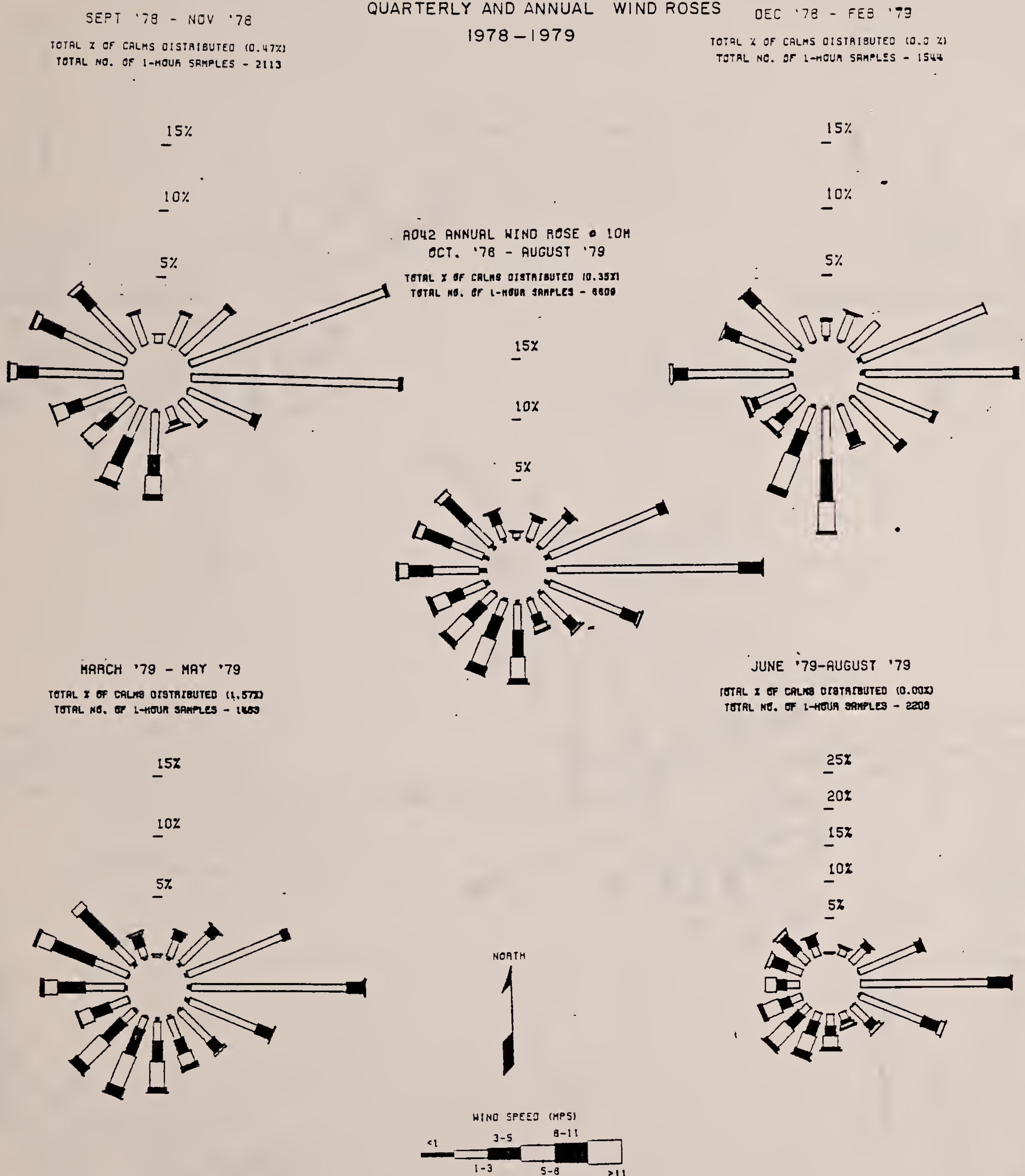
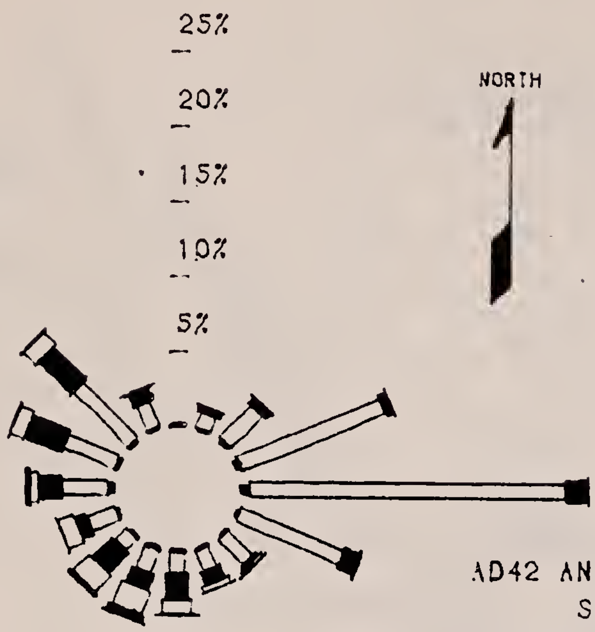


FIGURE A6.3.2-12

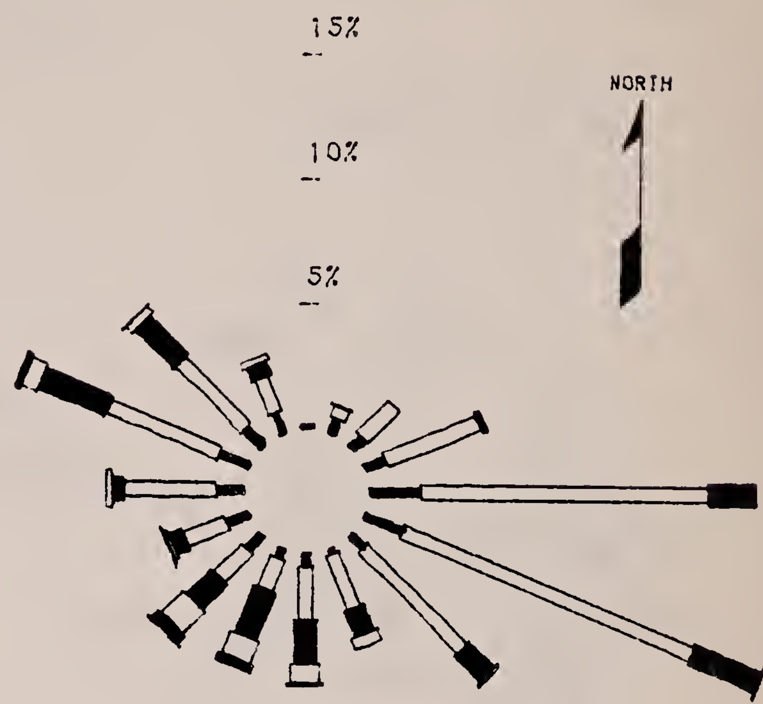
AD42 QUARTERLY WIND ROSE @ 10M
SEP '79 - NOV '79

TOTAL % OF CALMS DISTRIBUTED (0.30%)
TOTAL NO. OF 1-HOUR SAMPLES - 2000



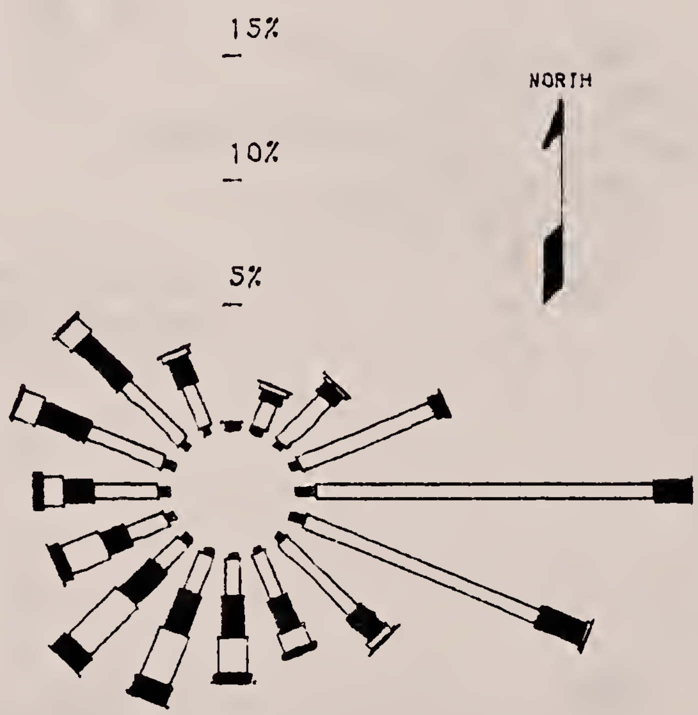
AD42 QUARTERLY WIND ROSE @ 10M
DEC '79 - FEB '80

TOTAL % OF CALMS DISTRIBUTED (0.71%)
TOTAL NO. OF 1-HOUR SAMPLES - 1691



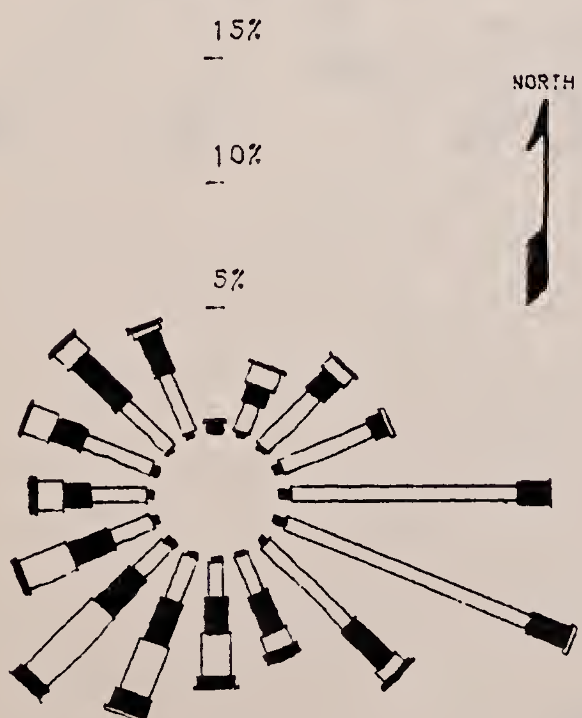
AD42 ANNUAL WIND ROSE @ 10M
SEP '79 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.77%)
TOTAL NO. OF 1-HOUR SAMPLES - 7277



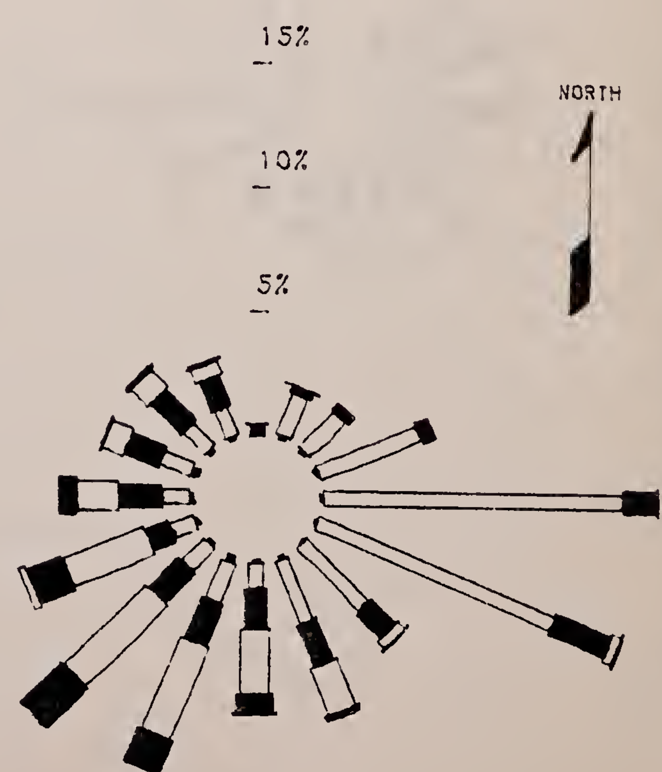
AD42 QUARTERLY WIND ROSE @ 10M
MAR '80 - MAY '80

TOTAL % OF CALMS DISTRIBUTED (1.85%)
TOTAL NO. OF 1-HOUR SAMPLES - 2050



AD42 QUARTERLY WIND ROSE @ 10M
JUN '80 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 1536



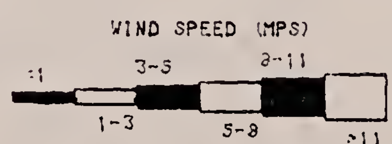
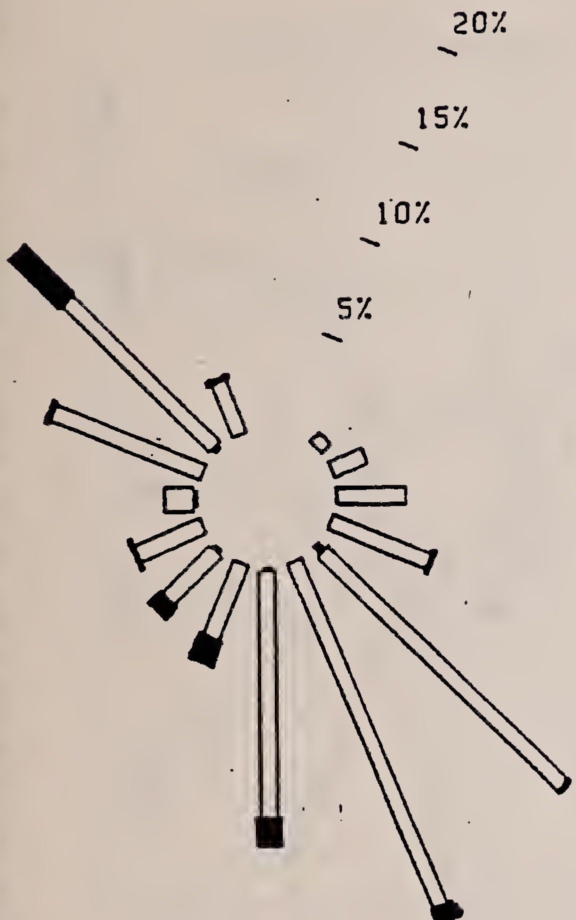


FIGURE A6.3.2-13

AD56 AT 10M LEVEL
QUARTERLY AND ANNUAL WIND ROSES
1978-1979

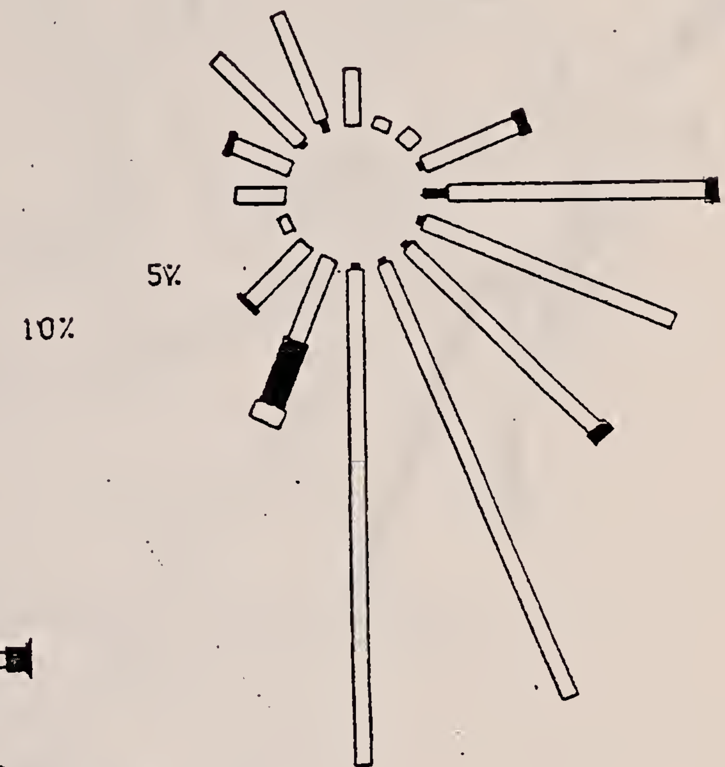
SEPT '78 - OCT '78

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 438



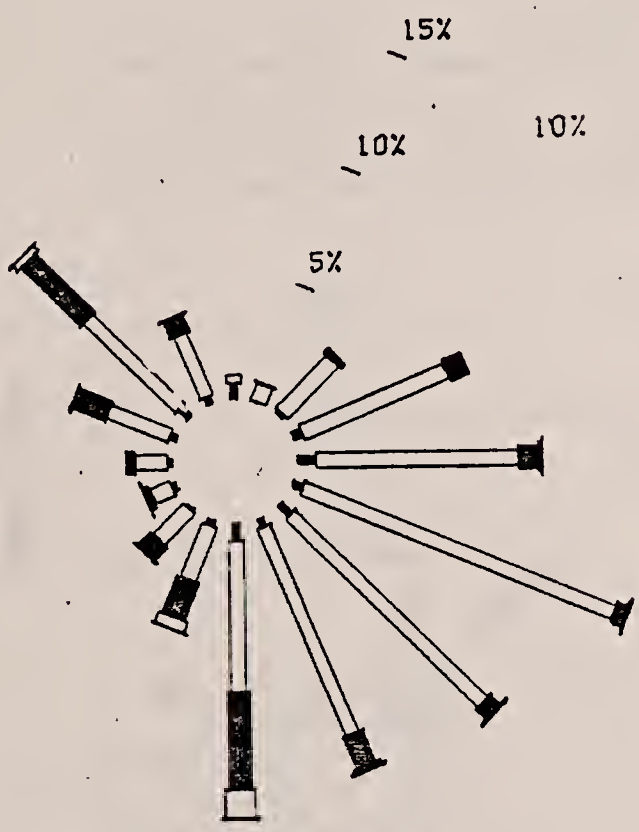
DEC '78 - FEB '79

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 433



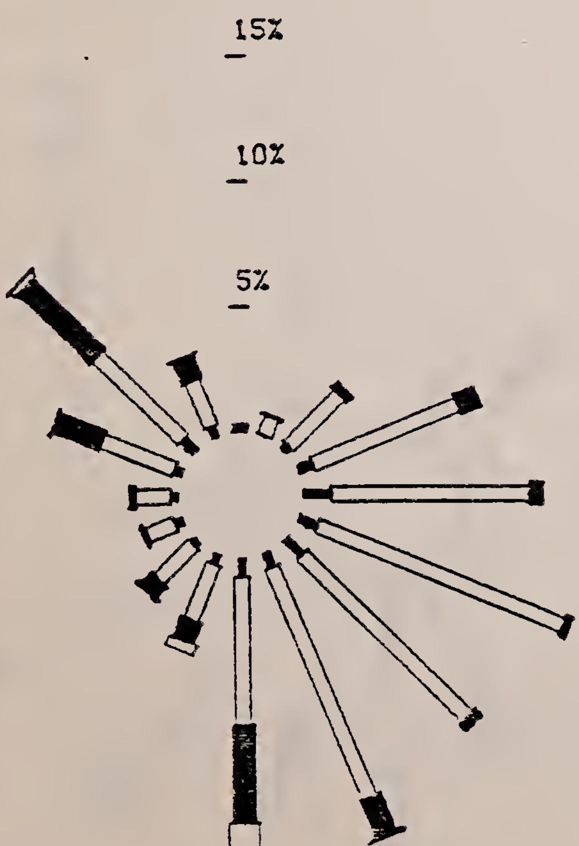
AD56 ANNUAL WIND ROSE @ 10M
OCT. '78 - AUGUST '79

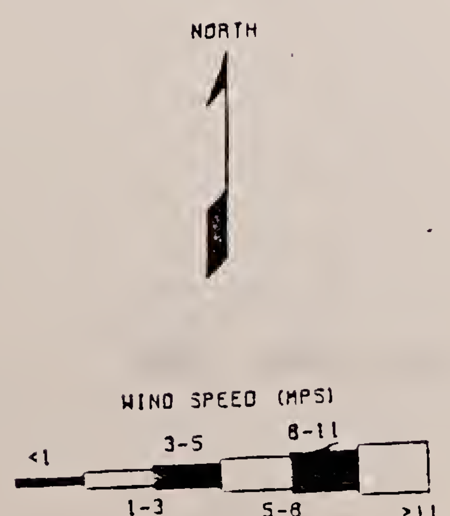
TOTAL % OF CALMS DISTRIBUTED (1.35%)
TOTAL NO. OF 1-HOUR SAMPLES - 4454



MARCH '79 - MAY '79

TOTAL % OF CALMS DISTRIBUTED (2.67%)
TOTAL NO. OF 1-HOUR SAMPLES - 2032





JUNE '79-AUGUST '79

TOTAL % OF CALMS DISTRIBUTED (0.00%)
TOTAL NO. OF 1-HOUR SAMPLES - 1308

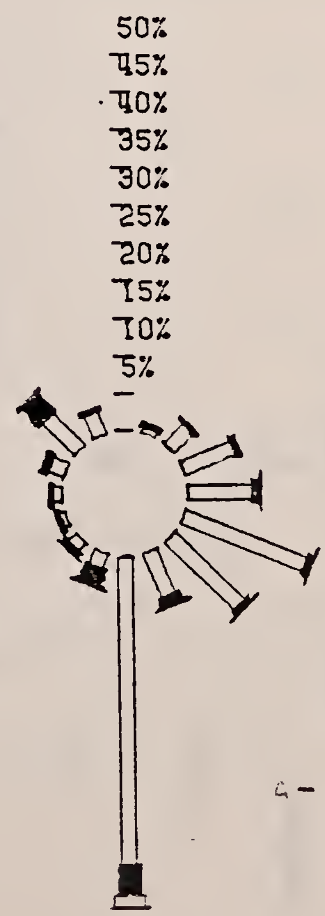
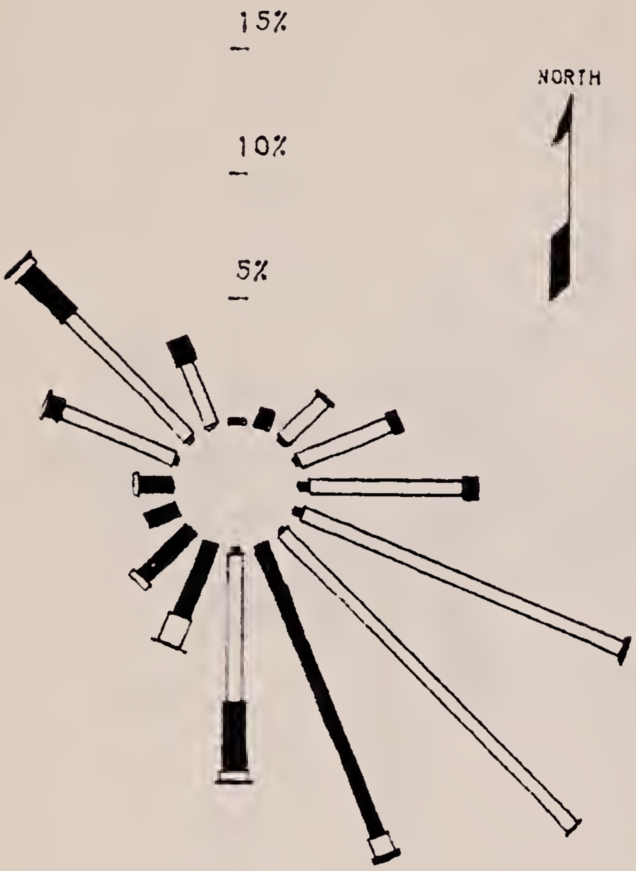


FIGURE A6.3.2-14

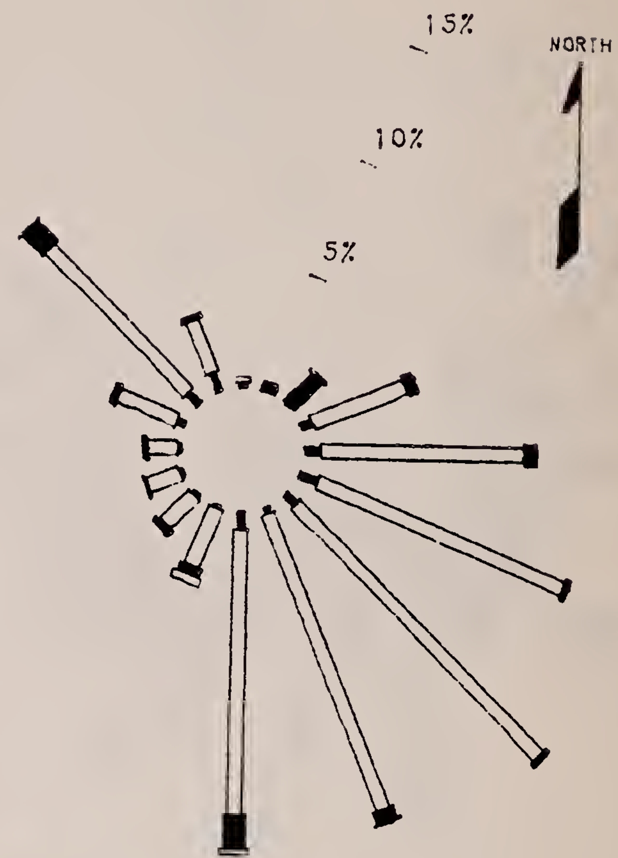
AD56 QUARTERLY WIND ROSE @ 10M
SEP '79 - NOV '79

TOTAL % OF CALMS DISTRIBUTED (0.37%)
TOTAL NO. OF 1-HOUR SAMPLES - 1601



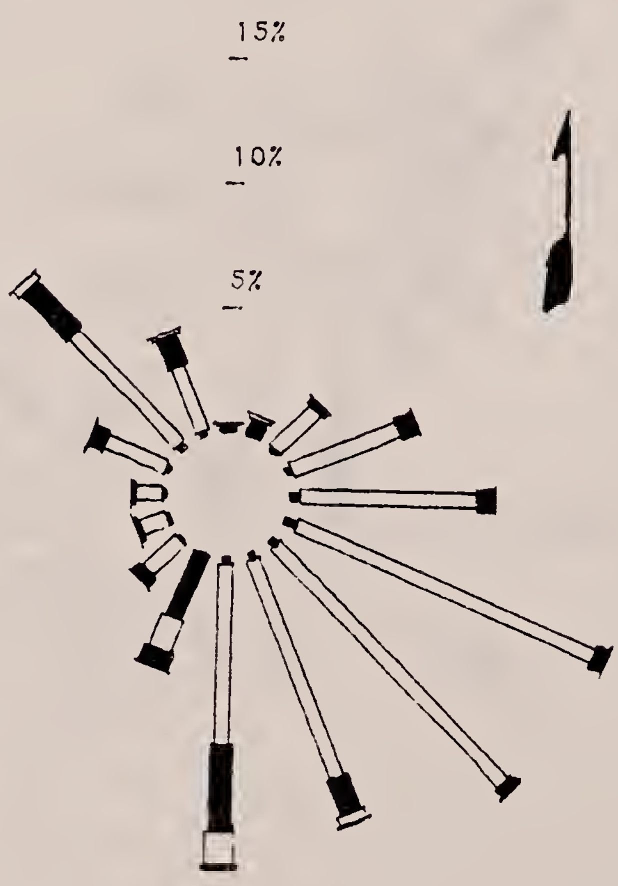
AD56 QUARTERLY WIND ROSE @ 10M
DEC '79 - FEB '80

TOTAL % OF CALMS DISTRIBUTED (4.01%)
TOTAL NO. OF 1-HOUR SAMPLES - 1389



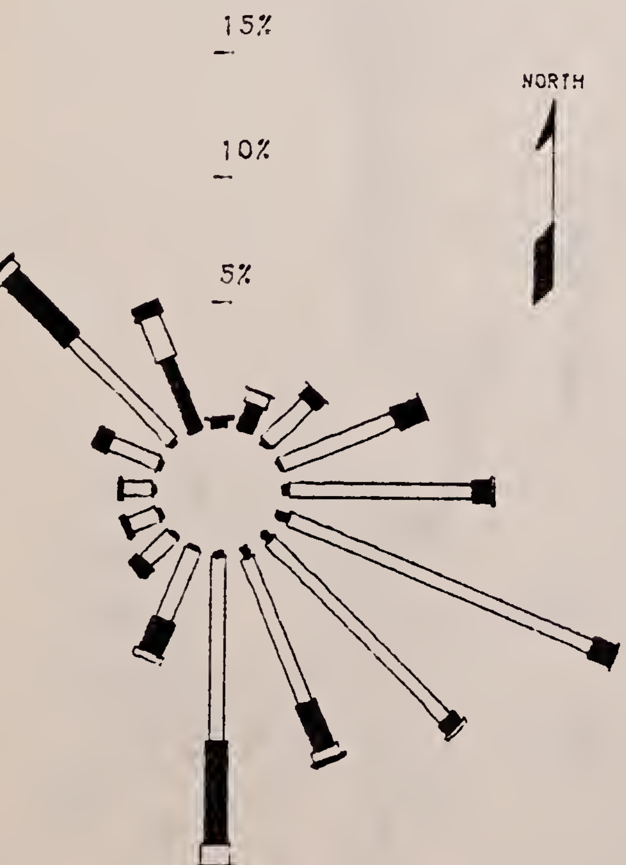
AD56 ANNUAL WIND ROSE @ 10M
SEP '79 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (2.31%)
TOTAL NO. OF 1-HOUR SAMPLES - 6414



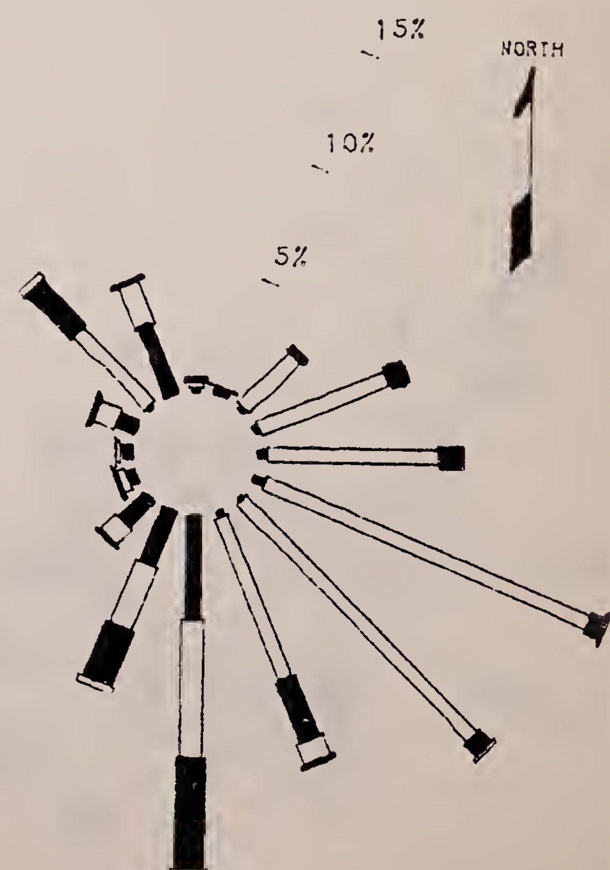
D56 QUARTERLY WIND ROSE @ 10M
MAR '80 - MAY '80

TOTAL % OF CALMS DISTRIBUTED (3.75%)
TOTAL NO. OF 1-HOUR SAMPLES - 2078



AD56 QUARTERLY WIND ROSE @ 10M
JUN '80 - AUG '80

TOTAL % OF CALMS DISTRIBUTED (0.0 %)
TOTAL NO. OF 1-HOUR SAMPLES - 1346



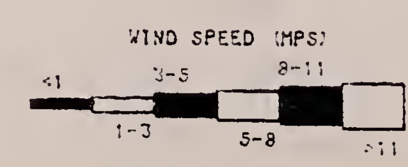


FIGURE A6.3.2-15

C-B AVERAGE HOURLY INVERSION HEIGHT – BY QUARTER

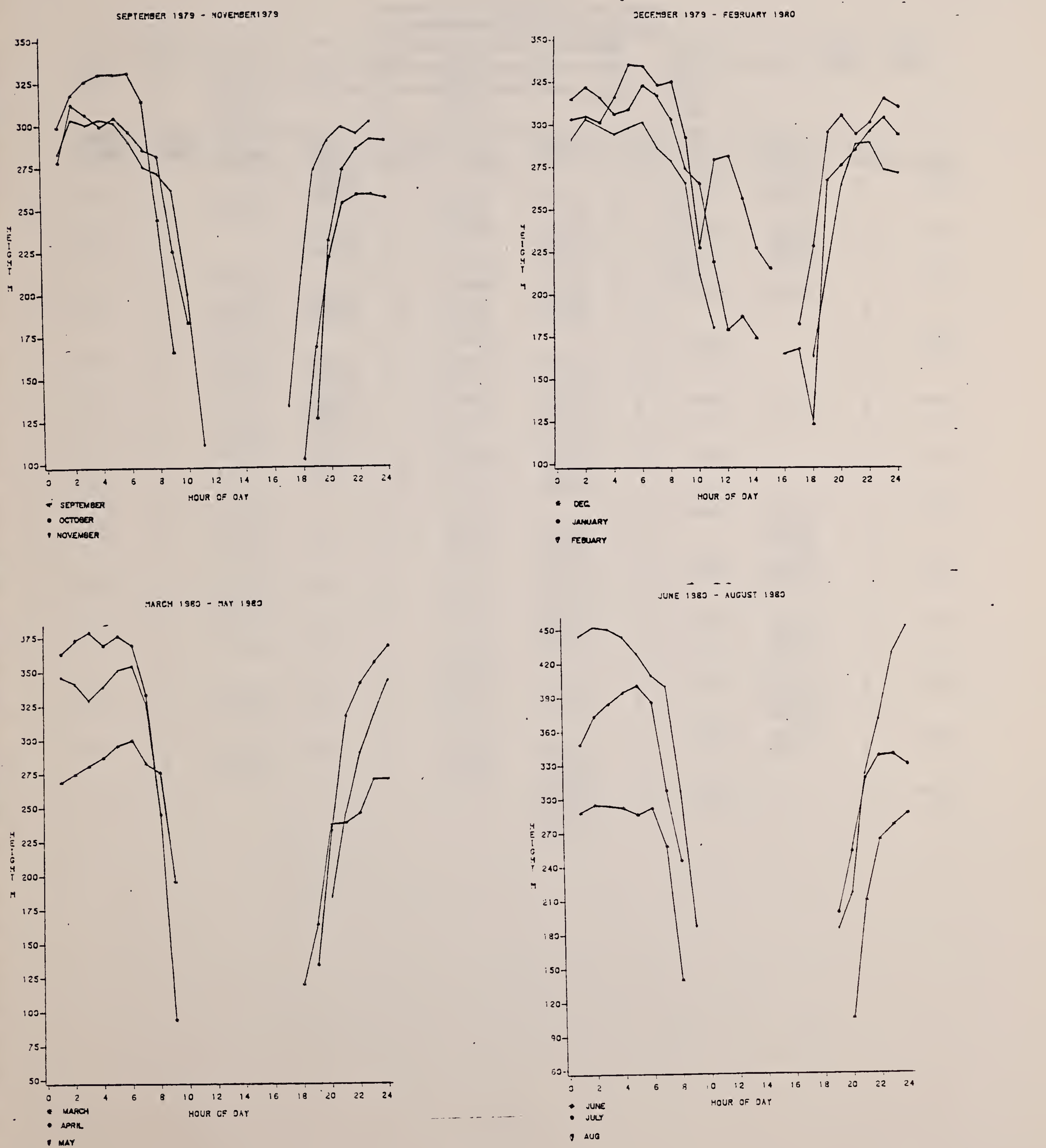


TABLE A6.3.2—1

TEMPERATURE LAPSE RATE AT 1,000 FEET ABOVE THE SURFACE AND ATMOSPHERIC STABILITY CATEGORIZED ACCORDING TO THE PASQUILL-GIFFORD STABILITY SCHEME

a) October 1974 and January-February 1975

NOTE: Numbers in parentheses give the lapse rate in °C per 100 meters

Date	Flight Number	Stability (Slope)	Date	Flight Number	Stability (Slope)	Date	Flight Number	Stability (Slope)	Date	Flight Number	Stability (Slope)
10/1/74	1	D(-0.5)	10/13/74	1		2/3/74	1	E(-0.33)			
	2	E(-0.43)		2			2	D(-0.64)			
	3	D(-0.98)		3	D(-0.91)		3	D(-0.90)			
	4	D(-1.1)		4	D(-1.2)		4	D(-0.95)			
10/2/74	1	E(-0.29)	10/14/74	1	E(0.0)	2/4/75	1	E(+0.02)			
	2	E(-0.28)		2	E(+0.25)		2	E(+0.21)			
	3	D(-0.94)		3	D(-0.84)		3	D(-1.02)			
	4	D(-0.94)		4	D(-0.87)		4				
10/3/74	1	E(+0.07)	10/15/74	1	D(-0.6)	2/6/75	1	E(-0.25)			
	2	D(-0.46)		2	E(-0.04)		2	E(-0.11)			
	3			3	D(-0.93)		3	D(-0.95)			
	4			4	D(-1.05)		4	D(-0.74)			
10/4/74	1		1/20/75	1		2/7/75	1				
	2			2	E(+0.15)		2				
	3			3	D(-0.62)		3	D(-0.74)			
	4			4	E(+0.16)		4	E(-0.31)			
10/5/74	1		1/23/75	1	E(+0.80)	2/8/75	1	E(-0.25)			
	2	F(3.37)		2	E(+0.69)		2	E(-0.25)			
	3			3	E(-0.18)		3	D(-1.02)			
	4			4	D(-0.80)		4	E(-0.46)			
10/6/74	1		1/24/75	1	D(-0.57)	2/9/75	1	D(-0.51)			
	2			2	D(-0.66)		2	E(-0.34)			
	3			3	D(-1.20)		3				
	4			4	E(+0.21)		4				
10/7/74	1	D(-0.54)	1/25/75	1							
	2	D(-0.71)		2	D(+0.93)						
	3	D(-0.93)		3	D(-1.10)						
	4	0(-1.07)		4	E(+0.59)						
10/8/74	1	E(+0.03)	1/26/75	1	D(-0.77)						
	2	E(-0.28)		2	E(+0.66)						
	3	D(-0.9)		3	D(-1.05)						
	4			4	D(-0.82)						
10/9/74	1	E(+0.79)	1/29/75	1	E(-0.03)						
	2	0(-0.56)		2	E(-0.03)						
	3	D(-0.98)		3	D(-0.98)						
	4	D(-1.03)		4	0(-0.98)						
10/10/74	1	E(-0.34)	1/31/75	1							
	2	D(-1.18)		2							
	3	D(-1.26)		3	D(-0.98)						
	4	D(-0.66)		4	D(-0.87)						
10/11/74	1	E(-0.14)	2/1/75	1							
	2	E(-0.34)		2	D(-0.93)						
	3			3	D(-1.37)						
	4			4	0(-0.87)						
10/12/74	1		2/2/75	1	D(-0.66)						
	2			2	E(+0.25)						
	3			3	D(-0.98)						
	4			4	D(-0.90)						

TABLE A6.3.2—1 (Continued)

b) April and July 1975

Date	Flight Number	Stability (Slope)	Date	Flight Number	Stability (Slope)	Date	Flight Number	Stability (Slope)	Date	Flight Number	Stability (Slope)
4/14/75	1	E(-0.31)	4/30/75	1	D(-0.67)	7/23/75	1	E(-0.29)			
	2	D(-0.85)		2	D(-0.87)		2	E(-0.33)			
	3	D(-0.85)		3	D(-0.95)		3	D(-0.87)			
	4	D(-1.08)		4	D(-1.00)		4	D(-0.88)			
4/15/75	1	D(-0.87)	5/1/75	1	E(-0.28)	7/24/75	1	E(-0.14)			
	2	D(-1.07)		2	D(-0.93)		2	E(-0.26)			
	3	D(-0.97)		3	D(-1.08)		3	D(-1.12)			
	4	D(-0.98)		4			4	D(-0.90)			
4/16/75	1	D(-0.57)	7/12/75	1	E(+0.29)	7/25/75	1	E(-0.16)			
	2	D(-1.02)		2	E(-0.40)		2	E(-0.28)			
	3	D(-1.07)		3	D(-0.93)		3	D(-0.80)			
	4			4	D(-0.96)		4	NF			
4/18/75	1		7/13/75	1	D(-0.62)	7/26/75	1	E(+0.06)			
	2			2	D(-1.00)		2	D(-0.53)			
	3	D(-0.90)		3	D(-1.20)		3	D(-0.62)			
	4	D(-0.95)		4	D(-0.96)		4	NF			
4/19/75	1	D(-0.67)	7/14/75	1	E(-0.50)						
	2	D(-0.90)		2	D(-0.76)						
	3	D(-0.90)		3	D(-0.90)						
	4	D(-1.00)		4	D(-0.93)						
4/20/75	1	D(-0.62)	7/15/75	1	E(-0.41)						
	2	D(-0.84)		2	D(-0.72)						
	3	D(-0.98)		3	D(-0.99)						
	4	D(-0.97)		4	D(-0.89)						
4/21/75	1	E(+0.77)	7/16/75	1	D(-0.75)						
	2	E(-0.03)		2	D(-1.04)						
	3	D(-0.95)		3	NF						
	4	D(-0.92)		4	NF						
4/22/75	1	D(-0.67)	7/17/75	1	D(-0.61)						
	2	D(-1.12)		2	D(-0.95)						
	3	D(-1.03)		3	D(-0.92)						
	4	D(-1.00)		4	D(-1.11)						
4/23/75	1	D(-0.64)	7/18/75	1	E(+0.07)						
	2	D(-0.98)		2	D(-1.00)						
	3	D(-1.00)		3	D(-0.75)						
	4	D(-1.03)		4	D(-1.03)						
4/24/75	1	E(-0.08)	7/19/75	1	E(-0.22)						
	2	D(-0.77)		2	E(-0.29)						
	3	D(-0.95)		3	NF						
	4	D(-1.05)		4	D(-0.97)						
4/25/75	1	D(-0.82)	7/20/75	1	E(-0.11)						
	2	D(-1.05)		2	E(-0.38)						
	3			3	D(-0.90)						
	4			4	D(-0.62)						
4/28/75	1	D(-0.71)	7/21/75	1	E(-0.50)						
	2	D(-0.97)		2	D(-0.87)						
	3	D(-0.93)		3	D(-1.08)						
	4			4	D(-0.71)						
4/29/75	1	D(-0.67)	7/22/75	1	E(-0.06)						
	2	D(-0.93)		2	D(-0.53)						
	3	D(-0.93)		3	D(-1.05)						
	4			4	D(-1.02)						

CHAPTER 8.0

Biology

CHAPTER 8.0 (Continued)

TABLE A8.5.1-1

BIRD SPECIES OBSERVED ON TRACT C.B. DURING SPRING CENSUS PERIOD, 1980

ORDER FAMILY Species	Common Name 1/	Observed Pinyon-Juniper	 Chained Pinyon-Juniper	 Fly over
FALCONIFORMES				
ACCIPITRIDAE				
Buteo swainsonii	Swainson's hawk			X
FALCONIDAE				
Falco sparverius	American kestrel		X	
COLUMBIFORMES				
COLUMBIDAE				
Zenaida macroura	mourning dove	X	X	
TROCHILIDAE				
Selasphorus platycercus	broad-tailed hummingbird			X
PICIFORMES				
PICIDAE				
Colaptes auratus	common flicker	X	X	
Picoides villosus	hairy woodpecker	X		
PASSERIFORMES				
TYRANNIDAE				
Tyrannus verticalis	Western kingbird		X	
Sayornis saya	Say's phoebe			X
Epidonax difficilis	Western flycatcher	X		
Epidonax oberholseri	Dusky flycatcher	X		
HIRUNDINIDAE				
Stelgidopteryx ruficollis	rough-winged swallow			X
CORVIDAE				
Gymnorhinus cyanocephalus	pinyon jay	X	X	
Nucifraga columbiana	Clark's nutcracker	X	X	
Corvus corax	common raven	X		
Pica pica	black-billed magpie			X

THP/pb (6/24/80)

ORDER FAMILY Species	Common name 1/	Observed Pinyon-Juniper	Chained Pinyon-Juniper	Fly over
PASSERIFORMES (Cont'd.)				
PARIDAE				
Parus gambeli	mountain chickadee	X	X	
SITTIDAE				
Sitta carolinensis	white-breasted nuthatch		X	
Sitta canadensis	red-breasted nuthatch		X	
TROGLODYTIDAE				
Troglodytes aedon	house wren	X	X	
TURDIDAE				
Turdus migratorius	American robin	X	X	
Catharus guttata	hermit thrush	X	X	
Sialia currucoides	mountain bluebird	X	X	
VIREONIDAE				
Vireo solitarius	solitary vireo	X		
PARULIDAE				
Vermivora virginiae	Virginia's warbler	X		
Dendroica coronata	yellow-rumped warbler		X	
Dendroica nigrescens	black-throated gray warbler	X		
ICTERIDAE				
Dolichonyx oryzivorus	Western meadowlark		X	
Euphagus cyanocephalus	Brewer's blackbird			X
FRINGILLIDAE				
Pipilo chlorura	green-tailed towhee	X	X	
Pooecetes gramineus	vesper sparrow	X	X	
Spizella passerina	chipping sparrow	X	X	
Chondestes grammacus	lark sparrow		X	
Spizella breweri	Brewer's sparrow	X	X	
Zonotricha leucophrys	White-crowned sparrow		X	

1/ Nomenclature follows the American Ornithologists' Union (AOU) Checklist of North American Birds (AOU 1957) and subsequent revisions (AOU 1973 and 1976).

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THP/pb (6/24/80)

TABLE A8.5.1-2

Avifauna Estimates of Species on Transect 1 (BH01)

Code	Name	Number of Observations	Coefficient of Determination	Density Per Hectare	Percent Relative Abundance
BRSPAR	Brewer's Sparrow	14	0.49	0.875	29.78
BRWARB	Black-Throated Gray Warbler	2	1.00	0.125	4.25
CHSPAR	Chipping Sparrow	2	0.50	0.125	4.25
GTTOWH	Green-Tailed Towhee	11	0.57	0.688	23.42
HOWREN	House Wren	7	0.50	0.438	14.91
MOBLUE	Mountain Bluebird	2	NA	0.125	4.25
MODOVE	Mourning Dove	3	1.00	0.188	6.40
RAVENS	Raven	1	NA	0.063	2.14
SOVIRE	Solitary Vireo	1	NA	0.063	2.14
SWALLO	Swallow	1	NA	0.063	2.14
VESPAR	Vespar Sparrow	2	0.57	0.125	4.25
WCSPAR	White Crowned Sparrow	1	NA	0.063	2.14
	TOTAL			2.938	

NOTES: NA = Not Available

TABLE A8.5.1-3

Avinfauna Estimates of Species on Transect 2 (BH02)

Code	Name	Number of Observations	Coefficient of Determination	Density Per Hectare	Percent Relative Abundance
BTWARB	Black-Throated Gray Warbler	7	0.60	0.438	15.93
CHSPAR	Chipping Sparrow	5	NA	0.313	11.38
CLNUTC	Clark's Nutcracker	3	NA	0.188	6.84
COFLIC	Common Flicker	1	0.90	0.063	2.29
HETHRU	Hermit Thrush	2	NA	0.125	4.55
HOWREN	House Wren	1	0.45	0.063	2.29
MOBLUE	Mountain Bluebird	4	0.42	0.250	9.09
MOCHIC	Mountain Chickadee	8	0.56	0.500	18.18
MODOVE	Mourning Dove	3	0.74	0.188	6.84
PINJAY	Pinyon Jay	3	1.00	0.188	6.84
RWSWAL	Rough-Winged Swallow	1	NA	0.063	2.29
SOVIRE	Solitary Vireo	3	0.59	0.188	6.84
VIWARB	Virginia's Warbler	2	0.75	0.125	4.55
WBNUTH	White Breasted Nuthatch	1	0.59	0.063	2.29
	TOTAL			2.750	

NA = Not Available

TABLE A8.5.1-4

Avifauna Estimates of Species on Transect 3 (BH03)

Code	Name	Number of Observations	Coefficient of Determination	Density Per Hectare	Percent Relative Abundance
BRBLAC	Brewer's Blackbird	2	NA	0.125	3.64
BRSPAR	Brewer's Sparrow	14	0.49	0.875	25.45
BRHUMM	Broad-Tailed Hummingbird	1	0.28	0.063	1.83
CHSPAR	Chipping Sparrow	1	0.63	0.063	1.83
COFLIC	Common Flicker	1	1.00	0.063	1.83
GTTOWH	Green-Tailed Towhee	12	0.57	0.750	21.82
HETHRU	Hermit Thrush	5	NA	0.313	9.09
HOWREN	House Wren	3	0.65	0.188	5.45
KESTRE	Kestrel	1	NA	0.063	1.83
MOBLUE	Mountain Bluebird	3	0.38	0.188	5.45
PINJAY	Pinyon Jay	3	0.25	0.188	5.45
RWSWAL	Rough Winged Swallow	1	NA	0.063	1.83
VESPAR	Vespar Sparrow	5	0.57	0.313	9.09
WEKING	Western Kingbird	1	NA	0.063	1.83
WEMEAD	Western Meadowlark	2	NA	0.125	3.64
	TOTAL			3.438	

NA = Not Available

TABLE A8.5.1-5

Avifauna Estimates of Species on Transect 4 (BH04)

Code	Name	Number of Observations	Coefficient of Determination	Density Per Hectare	Percent Relative Abundance
BRSPAR	Brewer's Sparrow	1	0.75	0.063	1.49
BRHUMM	Broad-Tailed Hummingbird	2		0.125	2.98
BRWARB	Black-Throated Gray Warbler	5	0.60	0.313	7.47
CHSPAR	Chipping Sparrow	3	0.13	0.188	4.49
CLNUTC	Clark's Nutcracker	19	1.00	1.188	28.37
DUFLYC	Dusky Flycatcher	1		0.063	1.49
EMFLYC	Empidonax Flycatcher	1		0.063	1.49
GTTOWH	Green-Tailed Towhee	4	0.31	0.250	5.97
HAWOOD	Hairy Woodpecker	1	0.25	0.063	1.49
HETHRU	Hermit Thrush	5	0.66	0.313	7.47
HOWREN	House Wren	1	0.47	0.063	1.49
MOBLUE	Mountain Bluebird	1	0.42	0.063	1.49
MOCHIC	Mountain Chickadee	7	0.52	0.438	10.46
RAVENS	Raven	2		0.125	2.98
RBNUTH	Red-breasted Nuthatch	2		0.125	2.98
ROBINS	Robin	2		0.125	2.98
RWSWAL	Rough-Winged Swallow	1		0.063	1.49
SOVIRE	Solitary Vireo	8	0.59	0.500	11.94
WEFLYC	Western Flycatcher	1		0.063	1.49
	TOTAL			4.188	

NA = Not Available

TABLE A8.5.1-6

Avifauna Estimates of Species on Transect 5 (BH05)

Code	Name	Number of Observations	Coefficient of Determination	Density Per Hectare	Percent Relative Abundance
BRSPAR	Brewer's Sparrow	10	0.75	0.625	24.84
BTHUMM	Broad-Tailed Hummingbird	1	NA	0.063	2.51
CHSPAR	Chipping Sparrow	1	0.13	0.063	2.51
CLNUTC	Clarks Nutcracker	4	1.00	0.250	9.98
GTTOWH	Green-Tailed Towhee	5	0.31	0.313	12.49
HOWREN	House Wren	1	0.47	0.063	2.51
LASPAR	Lark Sparrow	1	NA	0.063	2.51
MAGPIE	Magpie	1	NA	0.063	2.51
MOBLUE	Mountain Bluebird	1	0.42	0.063	2.51
ROBINS	Robin	1	NA	0.063	2.51
SOVIRE	Solitary Vireo	1	0.59	0.063	2.51
VESPAR	Vespar Sparrow	9	0.50	0.563	22.47
WEKING	Western Kingbird	3	NA	0.188	7.50
WEMEAD	Western Meadowlark	1	NA	0.063	2.51
	TOTAL			2.506	

NA = Not Available

Table A8.7.1-1 Herb quadrat summaries for Plot 3-0. Based on data from 25 permanently located quadrats. June 1980. Values in percents. ± values are equal to the standard error of the mean.

Species	Mean Cover	Relative Cover	Range of Cover Values	Frequency
HERBACEOUS SPECIES				
Agropyron smithii	6.12	29.82	2-10	100
Antennaria parvifolia	0.24	1.17	0- 2	36
Arabis holboellii	0.16	0.78	0- 2	32
Astraglus diversifolius	<0.01	<0.01	0-<1	8
Astragalus purshii	0.16	0.78	0- 1	28
Astragalus spatulatus	0.08	0.39	0- 1	12
Bromus tectorum	<0.01	<0.01	0-<1	4
Calochortus nuttallii	<0.01	<0.01	0-<1	76
Carex rossii	0.48	2.34	0- 3	72
Castilleja chromosa	0.12	0.58	0- 1	36
Collinsia parviflora	0.08	0.39	<1- 1	100
Crepis acuminata	0.64	3.12	0- 2	96
Erigeron pumilus	0.76	3.70	0- 3	84
Gayophytum ramocissimum	<0.01	<0.01	0-<1	12
Hedysarum boreale	0.36	1.75	0- 5	8
Koeleria gracilis	2.92	14.23	1- 5	100
Lomatium orientale	<0.01	<0.01	0-<1	44
Lupinus argenteus	<0.01	<0.01	0-<1	8
Microsteris micrantha	<0.01	<0.01	0-<1	28
Penstemon fremontii	0.24	1.17	0- 1	52
Phlox hoodii	2.20	10.72	<1- 4	100
Phlox longifolia	0.20	0.97	<1- 1	100
Poa fendleriana	1.48	7.21	<1- 4	100
Polygonum sawatchense	<0.01	<0.01	0-<1	24
Sphaeralcea coccinea	1.00	4.87	0- 7	64
Stipa comata	2.16	10.53	0-10	80
Townsendia sericea	<0.01	<0.01	0-<1	12
Trifolium gymnocarpon	0.96	4.68	0- 3	96
WOODY SPECIES				
Artemisia tridentata (seedlings)	0.16	0.78	<1- 1	100
Chrysothamnus depressus	<0.01	<0.01	0-<1	8
Total Herb Cover	16.80		11-24	
Total Woody Cover in Herb Layer	0.16		<1-1	

Table A8.7.1-1 Herb quadrat summaries for Plot 3-0. (continued)

	Mean Cover	Range of Cover Values
Mosses	0.32	0- 2
Foliose-Fruticose Lichens	0.76	0- 3
Litter	72.52	60-82
Bare Soil	26.32	15-40
	Mean ± S.E.	Range
No. of Herb Species/m^2	15.12 ± 0.302	12-18
Total Species/m^2	16.20 ± 0.306	13-19

Table A8.7.1-2 Frequency summaries for herb layer species in Plot 3-0, 1975-1980. Based on data from 25 permanently located $1.0m^2$ quadrats.

Species	Percent Frequency 1975	1976	1980
HERBACEOUS SPECIES			
Agropyron smithii	100	100	100
Antennaria parvifolia	20	16	36
Arabis holboellii	84	80	32
Astragalus diversifolius		4	8
Astragalus purshii	32	32	28
Astragalus scopulorum		8	
Astragalus spatulatus	24	12	12
Bromus tectorum			4
Calochortus nuttallii	100	0	76
Carex rossii	96	92	72
Castilleja chromosa	12		36
Castilleja linariaefolia	24	56	
Collinsia parviflora		60	100
Crepis acuminatus	100	100	96
Festuca brachyphylla (?)	64	96	
Gayophytum ramocissimum			12
Hedysarum boreale	16	8	8
Koeleria gracilis	100	100	100
Lomatium orientale	72	28	44
Lupinus argenteus		4	8
Microsteris micrantha	100	68	28
Penstemon fremontii	52	48	52
Phlox hoodii	100	100	100
Phlox longifolia	96	96	100
Poa fendleriana	64		100
Polygonum sawatchense			24
Sphaeralcea coccinea	68	68	64
Stipa comata	8	4	80
Townsendia sericea	8	4	12
Trifolium gymnocarpon	96	96	96
WOODY SPECIES			
Artemisia tridentata	44	68	100
Chrysothamnus depressus			8
Gutierrezia sarothrae	12	28	

Table A8.7.1-3 Mean cover and species diversity summaries for herbaceous quadrat studies at intensive study plots 3 and 4, 1975-1980.

	Plot 3-0			Plot 3-F			Plot 4-0			Plot 4-F		
	Mean Cover			Mean Cover			Mean Cover			Mean Cover		
	1975	1976	1980	1975	1976	1980	1975	1976	1980	1975	1976	1980
Herb Cover	30.4	27.8	16.8	44.2	45.8	24.5	17.3	7.3	3.9	13.7	9.3	3.9
Woody Cover	0.4	0.8	0.2	1.0	1.0	0.4	1.5	2.0	0.2	2.4	5.0	0.2
Mosses	2.6	3.2	0.3	1.2	0.9	0.3	27.3	31.2	13.1	35.0	36.6	19.6
Crustose Lichen	0	0	0	0	0	0	0	0	0	<0.1	<0.1	<0.1
Foliose-Fruticose Lichen	0.7	1.8	0.8	0.3	0.2	0.1	0	0	0	0	0	0
Litter	25.8	47.6	72.5	39.6	65.9	83.8	81.8	87.3	80.3	59.0	74.2	69.8
Bare Soil	51.4	52.4	26.3	23.8	34.1	15.8	6.8	9.5	6.6	16.9	14.8	10.4
Rock	0	0	0	0	0	0	0	0	0	0	<0.1	0.2
Mean No. of Herb Species per 1.0 m^2	15.12	13.68	15.12	16.64	15.04	17.16	4.60	4.24	4.28	3.52	2.88	2.60
Mean Total No. of Species per 1.0 m^2	15.68	14.64	16.20	17.76	16.28	18.28	5.16	5.00	4.72	4.32	3.96	3.00

Table A8.7.1-4 Herb quadrat summaries for Plot 3-F. Based on data from 25 permanently located quadrats. June 1980. Values in percents. ± values are equal to the standard error of the mean.

Species	Mean Cover	Relative Cover	Range of Cover Values	Frequency
HERBACEOUS SPECIES				
Agoseris glauca	0.24	0.81	0- 2	48
Agropyron smithii	2.80	9.45	<1- 8	100
Antennaria parvifolia	0.24	0.81	0- 2	36
Arabis holboellii	0.08	0.27	0- 1	64
Astragalus diversifolius	0.08	0.27	0- 1	32
Astragalus purshii	0.40	1.35	0- 3	24
Astragalus scopulorum	0.40	1.35	0- 9	12
Astragalus spatulatus	0.28	0.94	0- 5	16
Calochortus nuttallii	<0.01	<0.01	0-<1	92
Carex rossii	0.20	0.67	0- 1	44
Castilleja chromosa	0.80	2.70	0- 2	84
Collinsia parviflora	0.16	0.54	<1- 1	100
Crepis acuminata	1.48	4.99	0- 4	96
Delphinium nelsoni	<0.01	<0.01	0-<1	4
Erigeron pumilus	2.00	6.75	0- 4	96
Eriogonum alatum	0.20	0.67	0- 5	4
Gayophytum ramocissimum	0.08	0.27	1- 1	52
Hedysarum boreale	2.56	8.64	0-40	24
Koeleria gracilis	4.12	13.90	1- 8	100
Lomatium orientale	0.36	1.21	0- 1	64
Lupinus argenteus	0.84	2.83	0- 6	24
Microsteris micrantha	<0.01	<0.01	0-<1	8
Penstemon caespitosus	0.04	0.13	0- 1	4
Penstemon fremontii	0.28	0.94	0- 2	40
Phlox hoodii	2.60	8.77	0- 8	92
Phlox longifolia	0.68	2.29	<1- 2	100
Poa fendleriana	5.32	17.95	1-12	100
Polygonum sawatchense	0.20	0.67	0- 1	56
Sphaeralcea coccinea	0.80	2.70	0- 6	40
Stipa comata	1.20	4.05	0- 8	52
Townsendia sericea	<0.01	<0.01	0-<1	4
Trifolium gymnocarpon	0.80	2.70	0- 4	80
Zygadenus venenosus	<0.01	<0.01	0-<1	24
WOODY SPECIES				
Artemisia tridentata	0.32	1.08	<1- 3	100
Gutierrezia sarothrae	<0.01	<0.01	0-<1	4
Opuntia polyacantha	0.08	0.27	0- 2	8

Table A8.7.1-4 (continued) Herb quadrat summaries for Plot 3-F. Based on data from 25 permanently located quadrats. June 1980.

	Mean Cover	Range of Cover Values
Total Herb Cover	24.48	12-48
Total Woody Cover in Herb Layer	0.40	<1- 3
Mosses	0.28	0- 2
Foliose-Fruticose Lichens	0.12	0- 2
Litter	83.84	72-93
Bare Soil	15.76	7-28
	Mean ± S.E.	Range
No. of Herb Species/m	17.16 ± 0.415	12-21
Total Species/m	18.28 ± 0.414	13-22

Table A8.7.1-5 Frequency summaries for herb layer species in Plot 3-F, 1975-1980. Based on data from 25 permanently located 1.0m² quadrats.

Species	Percent Frequency 1975	1976	1980
HERBACEOUS SPECIES			
Agoseris glauca	88	4	48
Agropyron smithii	100	100	100
Antennaria parvifolia	28	28	36
Antennaria rosea	4		
Arabis holboellii	80	80	64
Astragalus diversifolius	20	28	32
Astragalus purshii	16	24	24
Astragalus scopulorum	12	12	12
Astragalus spatulatus	12	12	16
Bromus tectorum	4	4	
Calochortus nuttallii	100	20	92
Carex rossii	80	80	44
Castilleja spp.	64	80	84
Collinsia parviflora		92	100
Crepis acuminatus		88	96
Delphinium nelsoni	4		4
Erigeron pumilus	96	96	96
Eriogonum alatum	16	4	4
Festuca brachyphylla (?)	84	100	
Gayophytum ramocissimum	24	16	52
Hedysarum boreale	16	16	24
Koeleria gracilis	100	100	100
Lappula redowskii		4	
Lomatium orientale	80	16	64
Lupinus argenteus	12	24	24
Microsteris micrantha	100	56	8
Penstemon caespitosus		4	4
Penstemon fremontii	52	44	40
Phlox hoodii	88	92	92
Phlox longifolia	100	100	100
Poa fendleriana	92	20	100
Polygonum sawatchense	24	44	56
Sphaeralcea coccinea	36	36	40
Stipa comata	36		52
Taraxacum officinale	4		
Townsendia sericea			4
Trifolium gymnocarpon	88	84	80
Zygadenus venenosus	16		24
WOODY SPECIES AND CACTI			
Artemisia tridentata	88	96	100
Gutierrezia sarothrae	24	20	4
Opuntia polyacantha		8	8

Table A8.7.1-6 Herb quadrat summaries for Plot 4-0. Based on data from 25 permanently located quadrats. June 1980. Values in percents. ± values are equal to the standard error of the mean.

Species	Mean Cover	Relative Cover	Range of Cover Values	Frequency
HERBACEOUS SPECIES				
Agropyron smithii	0.68	16.35	0- 5	56
Bouteloua gracilis	0.12	2.88	0- 2	12
Bromus tectorum	0.20	4.81	0- 2	96
Chenopodium album	0.16	3.85	0- 4	48
Descurainia pinnata	0.12	2.88	0- 2	36
Erigeron pumillus	<0.01	<0.01	0-<1	4
Erysimum asperum	<0.01	<0.01	0-<1	4
Lappula redowskii	<0.01	<0.01	0-<1	32
Lepidium montanum	0.16	3.85	0- 3	16
Oryzopsis hymenoides	1.24	29.80	0- 6	48
Oryzopsis micrantha	0.20	4.81	0- 4	16
Physaria floribunda	<0.01	<0.01	0-<1	4
Polygonum sawatchense	<0.01	<0.01	0-<1	4
Schoenocrambe linifolia	0.28	6.73	0- 4	24
Sitanion longifolium	0.08	1.92	0- 2	4
Sporobolus cryptandrus	<0.01	<0.01	0-<1	4
Stipa comata	0.76	18.27	0-12	20
WOODY SPECIES				
Artemisia tridentata	0.12	2.88	0- 2	40
Opuntia polyacantha	0.04	0.96	0- 1	4
Total Herb Cover	3.92		<1-16	
Total Woody Cover in Herb Layer	0.20		0- 2	
Mosses	13.08		1-55	
Litter	80.28		45-97	
Bare Soil	6.64		0-45	

	Mean ± S.E.	Range
No. of Herb Species/m^2	4.28 ± 0.303	1- 7
Total Species/m^2	4.72 ± 0.368	1- 8

Table A8.7.1-7 Frequency summaries for herb layer species in Plot 4-0, 1975-1980. Based on data from 25 permanently located 1.0m^2 quadrats.

Species	Percent Frequency 1975	1976	1980
HERBACEOUS SPECIES			
Agropyron smithii	56	76	56
Agropyron trachycaulum	4		
Bouteloua gracilis	12	12	12
Bromus tectorum	100	100	96
Chenopodium album	68	44	48
Descurainia pinnata	40	24	36
Erigeron pumillus			4
Erysimum asperum			4
Lappula redowskii	52	24	32
Lepidium montanum	28	20	16
Oryzopsis hymenoides	20	32	48
Oryzopsis micrantha	20	20	16
Poa sp.	16	4	
Polygonum sawatchense			4
Physaria floribunda	8		4
Schoenocrambe linifolia	24	24	24
Sitanion longifolium		8	4
Sporobolus cryptandrus			4
Stipa comata	8	24	20
Viola nuttallii	4	4	
WOODY SPECIES AND CACTI			
Artemisia tridentata	44	64	40
Ceratoides lanata	8		
Chrysothamnus nauseosus		4	
Opuntia polyacantha		4	4
Symphoricarpos oreophilus	4	4	

Table A8.7.1-8 Herb quadrat summaries for Plot 4-F. Based on data from 25 permanently located quadrats. June 1980. Values in percents. ± values are equal to the standard error of the mean.

Species	Mean Cover	Relative Cover	Range of Cover Values	Frequency
HERBACEOUS SPECIES				
Agropyron smithii	0.64	15.53	0- 8	40
Arabis holboellii	<0.01	<0.01	0-<1	4
Bromus tectorum	0.16	3.88	0- 2	96
Carex rossii	0.04	0.97	0- 1	4
Chenopodium album	<0.01	<0.01	0-<1	8
Cryptantha sp.	<0.01	<0.01	0-<1	4
Descurainia pinnata	<0.01	<0.01	0-<1	8
Lepidium montanum	0.28	6.80	0- 5	24
Oryzopsis hymenoides	1.56	37.86	0-16	48
Physaria floribunda	0.04	0.97	0- 1	8
Schoenocrambe linifolia	0.04	0.97	0- 1	4
Stipa comata	1.16	28.16	0-18	12
WOODY SPECIES				
Artemisia tridentata	0.04	0.97	0- 1	28
Ceratoides lanata	0.12	2.91	0- 2	8
Symphoricarpos oreophilus	0.04	0.97	0- 1	4
Total Herb Cover	3.88		<1-18	
Total Woody Cover in Herb Layer	0.20		0- 2	
Mosses	19.56		3-70	
Crustose Lichen	<0.01		0-<1	
Litter	69.80		29-94	
Bare Soil	10.40		0-40	
Rock	0.24		0- 3	

	Mean ± S.E.	Range
No. of Herb Species/m²	2.60 ± 0.238	1-5
Total Species/m²	3.00 ± 0.294	1-6

Table A8.7.1-9 Frequency summaries for herb layer species in Plot 4-F, 1975-1980. Based on data from 25 permanently located $1.0m^2$ quadrats.

Species	Percent Frequency 1975	1976	1980
HERBACEOUS SPECIES			
Agropyron smithii	44	44	40
Arabis holboellii			4
Artemisia frigida	4	4	
Bromus tectorum	100	100	96
Carex rossii	4	4	4
Chenopodium album	40	20	8
Cirsium sp.	4		
Cryptantha sp.			4
Descurainia pinnata	28	12	8
Erigeron pumillus		4	
Koeleria gracilis		4	
Lappula redowskii	16		
Lepidium montanum	48	28	24
Oryzopsis hymenoides	32	40	48
Physaria floribunda	12	4	8
Poa sp.	4		
Schoenocrambe linifolia	4	4	4
Senecio multilobatus	4	4	
Sitanion longifolium		4	
Stipa comata	8	8	12
Taraxacum officinale	4		
Viola nuttallii		4	
WOODY SPECIES			
Artemisia tridentata	64	84	28
Ceratoides lanata	16	20	8
Symphoricarpos oreophilus		4	4

Table A8.7.1-10 Frequency, mean cover, and relative cover values for shrub species in Plots 3-0 and 3-F, 1974-1980. Based on data from 20 10m x 4m line strip transects.

	Frequency (%)			Mean Cover (%)			Relative Cover (%)		
	1974	1976	1980	1974	1976	1980	1974	1976	1980
Plot 3-0									
Artemisia tridentata	100	100	100	5.2	5.5	11.7	96.3	95.3	97.0
Juniperus osteosperma	5	15	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Opuntia polyacantha	55	20	35	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pinus edulis	15	20	20	0.2	0.3	0.4	3.7	5.2	3.0
Tetradymia canescens	--	--	5	--	--	<0.1	--	--	<0.1
Total				5.4	5.8	12.1			
Plot 3-F									
Amelanchier spp.	40	35	35	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Artemisia tridentata	100	100	100	10.0	12.3	14.1	92.6	92.4	93.2
Chrysothamnus nauseosus	10	15	10	0.1	0.4	0.1	0.9	2.8	0.7
Chrysothamnus viscidiflorus	5	--	15	<0.1	<0.1	<0.1	<0.1	--	0.2
Juniperus osteosperma & scopulorum	--	5	5	--	<0.1	<0.1	--	<0.1	<0.1
Opuntia polyacantha	35	30	40	0.1	<0.1	<0.1	0.5	<0.1	0.1
Pinus edulis	35	35	40	0.6	0.5	0.9	5.5	3.9	5.7
Symphoricarpos oreophilus	--	--	5	--	--	<0.1	--	--	<0.1
Total				10.8	13.2	15.1			

Table A8.7.1-11 Frequency, mean cover, and relative cover values for shrub species in Plots 4-0 and 4-F, 1974-1980. Based on data from 20 10m x 4m line strip transects.

	Frequency (%)			Mean Cover (%)			Relative Cover (%)		
	1974	1976	1980	1974	1976	1980	1974	1976	1980
Plot 4-0									
Artemisia tridentata	100	100	100	36.8	29.5	47.3	99.2	99.7	99.8
Ceratoides lanata	15	15	10	0.1	<0.1	0.1	0.3	<0.1	0.2
Chrysothamnus nauseosus	15	20	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysothamnus viscidiflorus	--	--	5	--	--	<0.1	--	--	<0.1
Opuntia polyacantha	35	30	20	0.2	0.1	<0.1	0.5	0.3	<0.1
Symphoricarpos oreophilus	--	10	--	--	<0.1	--	--	<0.1	--
Total				37.1	29.6	47.4			
Plot 4-F									
Artemisia tridentata	100	100	100	29.6	39.5	41.3	94.1	98.1	97.8
Ceratoides lanata	70	70	70	1.8	<0.1	0.9	5.9	<0.1	2.2
Chrysothamnus nauseosus	10	5	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysothamnus viscidiflorus	--	--	5	--	--	<0.1	--	--	<0.1
Juniperus scopulorum	--	5	5	--	<0.1	<0.1	--	<0.1	<0.1
Opuntia polyacantha	5	15	15	<0.1	0.8	<0.1	<0.1	1.9	<0.1
Purshia tridentata	5	--	5	<0.1	--	<0.1	<0.1	--	<0.1
Total				31.4	40.2	42.2			

Table A8.7.1-12 Density values (No. per hectare) for shrub species at Plots 3-0, 3-F, 4-0, and 4-F; upland and bottomland sagebrush communities. Values based on data from 20 10m x 4m line strip transects. Height Class I = 0.25-0.75m; Class II = 0.76-1.50m; Class III = 1.51-2.25m; Class IV = >2.25m.

Species	Height Class	Plot 3-0			Plot 3-F			Plot 4-0			Plot 4-F		
		1974	1976	1980	1974	1976	1980	1974	1976	1980	1974	1976	1980
Amelanchier spp.	Total				150		150						
	I				150		138						
	II						12						
Artemisia tridentata	Total	7050	5409	10337	8525	6773	9987	23462	33498	18239	18099	28862	18663
	I	7050	5409	10175	8500	6222	9062	17388	21504	7312	11625	20365	10438
	II			162	25	551	925	4362	9571	9420	4912	6973	6912
	III							1700	2374	1675	1562	1475	1288
	IV							12	49	12		49	25
Ceratoides lanata	Total							212	126	38	2588	3100	2975
	I							212	126	38	2588	3100	2950
	II												25
Chrysothamnus nauseosus	Total				25	61	38	62	99	12	50	24	25
	I				25	49	38	62	99	12	50	12	25
	II											12	
	III					12							
Chrysothamnus viscidiflorus	Total				12		62			225			12
	I				12		62			225			12
Juniperus osteosperma	Total	12	37	12		12							
	I	12	37	12		12							
Juniperus scopulorum	Total						38					12	12
	I						38					12	
	II												
	III												12

Table A8.7.1-12 (continued) Density values (No. per hectare) for shrub species at Plots 3-0, 3-F, 4-0, 4-F; upland and bottomland sagebrush communities.

Species	Height Class	Plot 3-0			Plot 3-F			Plot 4-0			Plot 4-F		
		1974	1976	1980	1974	1976	1980	1974	1976	1980	1974	1976	1980
Opuntia polyacantha	Total	288	49	175	100	126	162	125	163	100	88	126	12
	I	288	49	175	100	126	162	125	163	100	88	126	12
Pinus edulis	Total	37	49	50	112	99	162						
	I	25	49	38	100		112						
	II	12		12	12		50						
	III					99							
Purshia tridentata	Total										12		12
	I										12		12
Symphoricarpos oreophilus	Total						12		25				
	I						12		25				
Tetradymia canescens	Total			12									
	I			12									
TOTAL		7387	5544	10586	8924	7071	10611	23861	33911	18614	20837	32124	21711

Table A8.7.1-13 Herb quadrat summaries for the irrigation intensive study plot. Based on data from 25 permanently located quadrats. July 1980. Values in percents. ± values are equal to the standard error of the mean.

Species	Mean Cover	Relative Cover	Range of Cover Values	Frequency
HERBACEOUS SPECIES				
Agoseris glauca	0.04	0.35	0- 1	16
Agropyron smithii	2.12	18.60	0-11	56
Agropyron trachycaulum	1.60	14.04	0- 9	28
Antennaria rosea	0.44	3.86	0- 5	28
Arabis holboellii	0.04	0.35	0- 1	12
Aster fendleri	0.04	0.35	0- 1	12
Aster glaucodes	0.04	0.35	0- 1	4
Bromus tectorum	0.60	5.26	0- 4	96
Carex rossii	<0.01	<0.01	0-<1	4
Chaenactis douglasii	0.16	1.40	0- 3	16
Chenopodium album	<0.01	<0.01	0-<1	24
Collinsia parviflora	<0.01	<0.01	0-<1	20
Cryptantha sp.	<0.01	<0.01	0-<1	4
Descurainia pinnata	<0.01	<0.01	0-<1	8
Erigeron spp.	<0.01	<0.01	0-<1	8
Gayophytum ramocissimum	0.12	1.05	0- 1	44
Heterotheca villosa	0.92	8.07	0- 4	36
Ipomopsis aggregata	<0.01	<0.01	0-<1	4
Koeleria gracilis	0.52	4.56	0- 3	44
Lappula redowskii	<0.01	<0.01	0-<1	4
Microsteris micrantha	<0.01	<0.01	0-<1	8
Oryzopsis hymenoides	1.36	11.93	0- 9	36
Penstemon caespitosus	0.16	1.40	0- 2	16
Penstemon fremontii	<0.01	<0.01	0-<1	4
Phlox hoodii	0.80	7.02	0- 6	48
Phlox longifolia	0.24	2.11	0- 3	28
Physaria floribunda	0.12	1.05	0- 1	20
Poa fendleriana	0.80	7.02	0- 6	40
Polygonum sawatchense	0.04	0.35	0- 1	36
Sitanion longifolium	0.28	2.46	0- 3	48
Sphaeralcea coccinea	0.36	3.16	0- 5	16
Stipa comata	0.24	2.11	0- 3	12
Taraxacum officinale	0.08	0.70	0- 2	12
Townsendia sericea	<0.01	<0.01	0-<1	12
Unknown Mustard	<0.01	<0.01	0-<1	4
WOODY SPECIES				
Artemisia tridentata	0.24	2.11	0- 2	44
Chrysothamnus viscidiflorus	0.04	0.35	0- 1	8

Table A8.7.1-13 (continued) Herb quadrat summaries for the irrigation intensive study.

	Mean Cover	Range of Cover Values
Total Herb Cover	10.04	<1-19
Total Woody Cover in Herb Layer	0.28	0- 2
Mosses	0.04	0- 1
Crustose Lichen	0.52	0- 4
Litter	80.05	25-100
Bare Soil	15.72	0-71
Rock	3.76	0-30

	Mean ± S.E.	Range
No. of Herb Species/m^2	8.08 ± 0.661	1-15
Total Species/m^2	8.60 ± 0.702	1-15

Table A8.7.1-14 Mean cover, relative cover, frequency and density for shrub species in the irrigation intensive study plot. 1980 data. Height Class I = 0.25-0.75m; Class II = 0.76-1.50m; Class III = 1.51-2.25m; and Class IV = >2.25m. Values based on data from 20 10m x 4m line-strip transects.

	Height Class	Mean Cover (%)	Relative Cover (%)	Frequency (%)	Density (No. of Individuals/ha)	
Artemisia tridentata	Total	2.0	31.5	85		999
	I				512	
	II				475	
	III				12	
Chrysothamnus nauseosus	Total	<0.1	<0.1	30		112
	I				112	
Chrysothamnus viscidiflorus	Total	0.8	11.5	75		650
	I				625	
	II				25	
Juniperus osteosperma	Total	1.8	26.9	90		562
	I				138	
	II				312	
	III				100	
	IV				12	
Juniperus scopulorum	Total	<0.1	<0.1	10		25
	I					
	II				25	
Opuntia polyacantha	Total	<0.1	<0.1	5		25
	I				25	
Purshia tridentata	Total	0.6	8.6	20		175
	I				175	
Pinus edulis	Total	0.1	1.8	50		225
	I				62	
	II				125	
	III				38	

Table A8.7.1-14 (cont.) Mean cover, relative cover, frequency and density for shrub species in the irrigation intensive study plot.

	Height Class	Mean Cover (%)	Relative Cover (%)	Frequency (%)	Density (No. of Individuals/ha)	
Symphoricarpos oreophilus	Total	1.3	19.6	25		188
	I				150	
	II				38	
Unknown Shrub	Total	<0.1	<0.1	5		24
	I				12	
	II				12	
TOTAL		13.0			2985	2985

Table A8.7.2-1 Oven dry weights (grams/m^2) for range cages and adjacent open areas in the pinyon-juniper woodland community type. 1980

	Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
FENCED	46	-	4.80	-	13.64	5.66	0.96	-	25.06
	47	-	-	-	2.30	0.78	-	-	3.08
	48	-	-	2.95	0.91	1.09	-	-	4.95
	49	-	-	-	1.46	1.42	0.70	-	3.58
	50	5.28	-	-	7.29	3.42	0.08	-	16.07
	51	4.80	-	-	3.49	8.50	0.02	-	16.81
	52	3.16	-	-	4.38	0.07	-	3.95	11.56
	53	4.69	0.05	2.98	-	0.33	-	-	8.05
	54	-	0.91	-	7.48	6.00	0.58	-	14.97
	55	-	10.65	0.57	-	7.31	0.22	-	18.75
	56	-	-	0.30	1.48	3.73	-	-	5.51
	57	1.79	0.07	-	1.23	0.65	0.91	-	4.65
	58	0.23	-	-	5.80	0.35	-	-	6.38
	59	-	-	-	3.94	4.48	-	-	8.42
	60	5.09	0.14	0.58	2.20	-	0.10	-	8.11
OPEN	46	-	7.50	-	2.09	0.89	-	-	10.48
	47	1.64	-	4.29	1.31	0.20	-	-	7.44
	48	1.04	-	-	-	1.53	-	-	2.57
	49	4.35	0.84	-	1.94	0.05	0.11	-	7.29
	50	0.82	-	-	3.89	1.60	-	-	6.31
	51	4.33	-	-	7.19	0.80	0.01	-	12.33
	52	2.74	-	-	0.15	0.26	-	-	3.15
	53	5.45	0.03	2.37	-	0.40	-	-	8.25
	54	-	0.52	-	1.69	3.45	0.61	-	6.27
	55	10.99	10.29	2.24	27.42	3.38	3.34	-	57.66
	56	-	-	3.09	-	0.56	-	-	3.65
	57	0.61	-	-	2.68	0.28	1.01	-	4.58
	58	5.35	-	4.84	0.38	-	-	-	10.57
	59	-	-	-	2.86	6.97	-	-	9.83
	60	0.32	0.02	2.07	1.61	0.27	0.08	-	4.37

Table A8.7.2-2 Mean production (grams/m^2) $\pm$ the standard error of the mean (S.E.), frequency, and range of observed values for clipped plots in the pinyon-juniper woodland community type. 1980 data.

	Mean $\pm$ S.E.	Sample Size	Frequency (%)	Range of Values
OPEN AREAS				
Agropyron smithii	2.51 $\pm$ 0.80	15	73	0-10.99
Bromus tectorum	1.28 $\pm$ 0.81	15	40	0-10.29
Oryzopsis hymenoides	1.26 $\pm$ 0.57	15	40	0-4.84
Perennial Grasses	3.54 $\pm$ 2.01	15	80	0-27.42
Perennial Forbs	1.37 $\pm$ 0.49	15	93	0-6.97
Annual Forbs	0.344 $\pm$ 0.22	15	40	0-3.34
Total Biomass	10.32 $\pm$ 3.46	15	100	2.57-57.66
RANGE CAGES				
Agropyron smithii	1.67 $\pm$ 0.58	15	46	0-5.28
Bromus tectorum	1.10 $\pm$ 0.75	15	40	0-10.65
Oryzopsis hymenoides	0.49 $\pm$ 0.26	15	33	0-2.95
Perennial Grasses	3.71 $\pm$ 0.94	15	87	0-13.64
Perennial Forbs	2.92 $\pm$ 0.74	15	93	0-8.50
Annual Forbs	0.24 $\pm$ 0.09	15	53	0-0.96
Half Shrubs	0.26 $\pm$ 0.26	15	7	0-3.95
Total Biomass	10.40 $\pm$ 1.69	15	100	3.08-25.06

Table A8.7.2-3 Oven dry weights (grams/m^2) for range cages and adjacent open areas in the chained rangeland community type. 1980

	Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
FENCED	61	29.67	1.44	5.51	3.13	0.79	-	-	40.54
	62	5.52	-	-	25.58	8.47	-	-	39.57
	63	6.00	-	-	23.01	-	1.31	-	30.32
	64	2,52	-	-	22.12	4.21	1.25	-	30.10
	65	11.85	-	-	30.47	7.61	.34	-	50.27
	66	-	0.32	11.43	38.11	5.06	0.20	-	55.12
	67	12.64	-	0.94	16.37	3.03	0.20	-	33.18
	68Irr	39.57	-	-	15.70	13.33	0.67	-	69.27
	69	0.14	0.29	-	35.06	-	0.40	-	35.89
	70	-	0.10	-	9.09	4.16	0.80	-	14.15
	71	7.63	-	2.13	20.17	6.07	0.50	-	36.50
	72	-	0.33	-	38.16	2.25	0.08	-	40.82
	73	3.00	26.35	0.76	26.47	0.31	0.97	-	57.86
	74	1.73	2.70	-	11.07	15.66	1.44	-	32.60
	75	7.45	0.05	-	20.25	17.40	0.04	-	45.19
OPEN	61	-	0.35	7.17	6.29	3.66	-	-	17.47
	62	20.34	-	-	12.13	26.47	0.47	-	59.41
	63	1.57	-	-	46.32	-	-	-	47.89
	64	13.64	-	0.83	22.48	4.96	0.19	-	42.10
	65	3.26	0.02	-	18.13	17.55	-	-	38.96
	66	-	4.07	-	26.81	11.81	-	-	42.69
	67	5.96	0.03	1.72	15.90	10.39	0.04	-	34.04
	68Irr	20.62	-	-	14.71	10.39	0.63	-	46.35
	69	4.56	0.24	-	24.56	6.87	0.69	-	36.92
	70	-	0.09	-	3.10	5.40	1.00	-	9.59
	71	-	0.09	5.28	10.81	-	0.09	-	16.27
	72	7.42	0.08	1.46	20.92	-	0.39	-	30.27
	73	7.39	11.73	-	18.94	2.06	-	-	40.12
	74	3.04	0.18	-	4.88	5.24	0.51	-	13.85
	75	7.67	0.41	-	11.33	8.76	0.05	-	28.22

Table A8.7.2-4 Mean production (grams/m^2) $\pm$ the standard error of the mean (S.E.), frequency, and range of observed values for clipped plots in the chained rangeland community type. 1980 data.

	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
OPEN AREAS				
Agropyron smithii	6.36 ± 1.78	15	73	0-20.62
Bromus tectorum	1.15 ± 0.80	15	73	0-11.73
Oryzopsis hymenoides	1.10 ± 0.56	15	33	0-7.17
Perennial Grasses	17.15 ± 2.78	15	100	3.10-46.32
Perennial Forbs	7.57 ± 1.86	15	80	0-26.47
Annual Forbs	0.27 ± 0.08	15	67	0-1.00
Total Biomass	33.61 ± 3.68	15	100	9.59-59.41
RANGE CAGES				
Agropyron smithii	8.51 ± 2.97	15	80	0-39.57
Bromus tectorum	2.11 ± 1.74	15	53	0-26.35
Oryzopsis hymenoides	1.38 ± 0.81	15	33	0-11.43
Perennial Grasses	22.32 ± 2.69	15	100	3.13-38.16
Perennial Forbs	5.89 ± 1.46	15	87	0-17.40
Annual Forbs	0.55 ± 0.13	15	87	0-1.44
Total Biomass	40.76 ± 3.46	15	100	14.15-69.27

Table A8.7.2-5 Oven dry weights (grams/m^2) for range cages and adjacent open areas in the upland sagebrush community type. 1980

	Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
FENCED	76	24.97	-	-	11.12	16.14	-	-	52.23
	77	.34	.21	-	40.03	8.22	-	-	48.80
	78	17.88	-	-	19.40	10.24	0.60	-	48.12
	79	1.91	-	-	14.64	10.12	-	-	26.67
	80	2.42	-	-	11.11	4.28	-	-	17.81
	81	8.53	-	-	22.52	15.50	0.05	-	46.60
	82	0.89	-	-	22.15	6.77	0.14	-	29.95
	83	28.26	-	-	7.83	9.40	0.58	-	46.07
	84	23.17	-	-	11.74	30.04	-	-	64.95
	85	20.94	-	-	15.54	9.39	-	-	45.87
	86	9.33	-	-	1.93	12.41	0.16	-	23.83
	87	Data missing due to construction activity.							
	88	3.77	-	-	25.90	2.99	-	-	32.66
	89	23.02	0.03	2.88	31.44	5.19	-	-	62.56
	90	10.75	-	-	7.82	17.17	0.17	-	52.74
OPEN	76	1.33	-	-	25.51	6.98	-	-	33.82
	77	-	0.05	-	16.62	10.74	-	-	27.41
	78	8.01	-	-	9.67	11.98	0.05	-	29.71
	79	6.81	-	-	14.29	5.20	-	-	26.30
	80	1.60	-	-	23.41	-	-	-	25.01
	81	6.70	-	-	11.58	10.39	-	-	26.67
	82	10.19	-	-	6.97	11.80	0.18	-	29.14
	83	8.68	-	-	9.45	7.41	0.12	-	25.66
	84	8.60	-	-	8.52	39.97	-	-	57.09
	85	11.03	-	-	10.91	4.02	-	-	25.96
	86	6.42	-	-	1.30	4.25	-	-	11.97
	87	Data missing due to construction activity							
	88	2.10	-	-	17.43	0.24	-	-	19.77
	89	16.50	-	-	13.21	3.40	-	-	33.11
	90	11.72	-	-	9.30	7.65	0.01	-	28.68

Table A8.7.2-6 Mean production (grams/m^2) $\pm$ the standard error of the mean (S.E.), frequency, and range of observed values for clipped plots in the upland sagebrush community type. 1980 data

	Mean $\pm$ S.E.	Sample Size	Frequency (%)	Range of Values
OPEN AREAS				
Agropyron smithii	7.12 $\pm$ 1.24	14	93	0-16.50
Bromus tectorum	0.004 $\pm$ 0.004	14	7	0-0.05
Perennial Grasses	12.73 $\pm$ 1.72	14	100	1.30-25.51
Perennial Forbs	8.86 $\pm$ 2.61	14	93	0-39.97
Annual Forbs	0.03 $\pm$ 0.01	14	29	0-0.18
Total Biomass	28.59 $\pm$ 2.63	14	100	11.97-57.09
RANGE CAGES				
Agropyron smithii	12.58 $\pm$ 2.70	14	100	0.34-28.26
Bromus tectorum	0.017 $\pm$ 0.015	14	14	0-0.21
Oryzopsis hymenoides	0.21 $\pm$ 0.21	14	7	0-2.88
Perennial Grasses	17.37 $\pm$ 2.75	14	100	1.93-40.03
Perennial Forbs	11.28 $\pm$ 1.85	14	100	2.99-30.04
Annual Forbs	0.12 $\pm$ 0.06	14	43	0-0.60
Total Biomass	42.78 $\pm$ 3.84	14	100	17.81-64.95

Table A8.7.2-7 Oven dry weights (grams/m^2) for range cages and adjacent open areas in the bottomland sagebrush community type. 1980

	Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
FENCED	31	-	9.24	-	6.94	0.10	-	-	16.28
	32	-	0.87	-	1.98	-	-	-	2.85
	33	0.32	3.36	-	2.77	-	1.79	-	8.24
	34	-	0.22	-	14.35	1.49	0.16	-	16.22
	35	1.39	-	-	21.66	3.16	-	-	26.21
	36	0.06	5.42	-	-	-	2.50	-	7.98
	37	2.51	2.33	-	-	-	.25	-	5.09
	38	-	0.17	4.21	-	0.31	-	-	4.69
	39	1.67	-	-	13.30	2.59	0.08	-	17.64
	40	-	20.13	-	11.48	27.52	0.24	-	59.37
	41	3.28	0.37	-	6.51	22.05	6.94	-	39.15
	42	-	0.19	-	17.12	0.81	-	-	18.12
	43	-	-	-	17.03	4.45	-	-	21.48
	44	41.77	-	-	44.75	-	0.43	-	86.95
	45	4.28	2.61	-	58.71	7.68	1.70	-	74.98
OPEN	31	-	2.52	-	3.20	-	-	-	5.72
	32	.40	1.67	-	1.06	2.16	.07	-	5.36
	33	-	0.68	-	2.54	-	1.23	-	4.45
	34	-	0.49	-	30.12	-	-	-	30.61
	35	0.31	0.49	-	-	2.21	0.07	-	3.08
	36	-	3.05	-	-	6.59	0.42	-	10.06
	37	1.49	1.36	-	0.54	2.47	.20	-	6.06
	38	0.38	0.08	-	0.02	-	0.03	-	0.51
	39	0.07	0.05	-	15.48	-	0.03	-	15.63
	40	-	6.41	-	6.34	6.52	0.52	-	19.79
	41	1.07	1.23	-	5.80	3.16	1.19	-	12.45
	42	0.88	1.58	-	17.61	0.47	0.24	-	20.78
	43	-	0.07	-	9.56	1.80	-	-	11.43
	44	70.75	-	-	19.67	-	-	-	90.42
	45	3.77	0.09	-	26.32	1.50	0.07	-	31.75

Table A8.7.2-8 Mean production (grams/m^2) $\pm$ the standard error of the mean (S.E.), frequency, and range of observed values for clipped plots in the bottomland sagebrush community type. 1980 data.

	Mean $\pm$ S.E.	Sample Size	Frequency (%)	Range of Values
OPEN AREAS				
Agropyron smithii	5.27 $\pm$ 4.68	15	60	0-70.75
Bromus tectorum	1.32 $\pm$ 0.44	15	93	0-6.41
Perennial Grasses	9.22 $\pm$ 2.62	15	87	0-30.12
Annual Forbs	0.27 $\pm$ 0.11	15	73	0-1.23
Total Biomass	17.87 $\pm$ 5.74	15	100	0.51-90.42
RANGE CAGES				
Agropyron smithii	3.69 $\pm$ 2.74	15	53	0-41.77
Bromus tectorum	2.99 $\pm$ 1.40	15	73	0-20.13
Oryzopsis hymenoides	0.28 $\pm$ 0.28	15	7	0-4.21
Perennial Grasses	14.44 $\pm$ 4.36	15	80	0-58.71
Perennial Forbs	4.68 $\pm$ 2.20	15	67	0-27.52
Annual Forbs	0.94 $\pm$ 0.48	15	60	0-6.94
Total Biomass	27.02 $\pm$ 6.83	15	100	2.85-86.95

Table A8.7.2-9 Fresh weight estimates (grams) for intensive study plot BJ21 (1-F), chained pinyon-juniper rangeland. July, 1980

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Agropyron smithii	10			62	3			39							25					6	78	8			
				6						11			22								10				28
Bromus tectorum	<1		<1	2	<1			<1	<1	1	<1			<1	<1		<1		<1		<1	1	1	<1	<1
				2	<1	<1					<1	14	<1		11			1	<1	1	<1		1		1
Oryzopsis hymenoides	21		4	10				3		7	14	10		4	3				6	21			10		
				5	4	19					5	74	8	8	2			10		33			6	22	3
Perennial grasses	6	28	34	18	145	72	58	11	4	3	44	40	36	38		23	31	62	103	88	15	15	16	8	45
	101	76	29	14	32	26	77	55	85	21	10	25	3	44	49	75	57	28	30	15	8	47	92		6
Annual grasses																									
Perennial forbs	18	8	4	9				1		2		<1		1	16	2			2	2	<1				
					5	22	2			7	14				3		3	26	5	1					<1
Annual forbs		<1						<1								<1						<1	<1	<1	
	<1			<1							<1	1						1	2	4	1		<1	<1	3
Half shrubs																									
																		14							
Total Biomass	55	36	42	101	148	72	58	54	4	13	58	50	36	43	44	25	31	62	111	117	93	24	27	8	45
	101	76	29	27	41	67	79	55	85	39	29	114	33	52	65	75	60	80	37	54	19	47	99	22	41

Table A8.7.2-10 Fresh weight estimates (grams) for intensive study plot BJ22 (2-F), chained pinyon-juniper rangeland. July, 1980

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Agropyron	1	4	7	23	22		29	5		35	11		19	24	9	4		38	22			26	23	21	
smithii		20	23	4	4			27	46	35	21				11	6	49			3	6	3	19	9	
Bromus	2	<1	1	<1	<1		<1	<1		2	<1		2			1	4	2	1	<1	<1	<1	2	1	1
tectorum	<1	2	<1		<1	<1	1	9	10	<1	<1	<1	1	<1	4	2	<1	1	4	1	11	2	1	<1	1
Oryzopsis							6							8						18					
hymenoides			5		7	25						28		65			10			20		58	3	7	21
Perennial	26	32	36	2	3	4	1	59	68		1			1	55	42	4				12	10	1		9
Grasses	18	9	2	48	8	34	5	7	4	1	19	17	22	16	15	2		43	19	23	1	5			14
Annual																									
Grasses																									
Perennial		1	1		4		5	1	2		<1		9	12	4	2	23			4	33	6	2	3	4
Forbs	85		23	<1	5	1		2		11	1	12		1		2	13	2	6	7		5	31	5	
Annual		<1	<1	<1			<1	<1					<1	<1			<1					1			<1
Forbs	<1	<1	<1		<1	<1	1	<1			1	<1	<1	<1	<1	<1	<1		<1		<1	<1	<1	<1	
Half																									
Shrubs																		14							
Total	29	37	45	25	29	4	41	65	70	37	12		30	45	68	49	31	40	23	22	45	43	28	25	14
Biomass	103	31	53	52	24	60	7	42	60	47	42	57	23	82	30	12	72	46	29	54	18	72	54	21	36

Table A8.7.2-11 Fresh weight estimates (grams) for intensive study plot BJ25 (5-F), pinyon-juniper woodland. July, 1980

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Agropyron smithii		1	2		16		21	26	1	18	5	5	8	3		13		15	8	7	14		6		
		4	16						2	21			7	17		19			2	6	12				
Bromus tectorum		<1		<1	1	<1				<1	<1		<1	2	<1	<1		<1	<1	<1				<1	2
		<1			<1	1	<1			<1	<1	<1	1		<1		<1		3					<1	
Oryzopsis hymenoides	19	18	10					9	6	3	21	23		8	16		8	24		7	2	12	5		2
	7		1	3		19	10	23		12	36	12		10	3		6	11		32		10	2		
Perennial Grasses		9	10	31	25	9	10	2	8	21	9	14	19	21		12		6	9	3	2	13		16	19
	8	15	10	4	20	4	29		19	16	11		14	17	8	4	3	5	27		6	1	8	27	9
Annual Grasses																									
Perennial Forbs		5		2			9	2		1	4		8	5	2		<1	1		<1	3		1		
		6	7	3						4						2	1	4	<1				6	4	6
Annual Forbs		<1	<1	<1	<1			<1	<1	1			1	<1		1		<1	<1	<1		<1		1	2
		1	<1	<1	<1																				
Half Shrubs																									
Total Biomass	19	33	22	33	42	9	40	39	15	44	39	42	36	39	18	26	8	46	17	17	21	25	12	17	25
	15	26	34	10	20	24	39	23	21	53	47	12	22	44	11	25	10	20	32	38	18	11	16	31	15

Table A8.7.2-12 Fresh weight estimates (grams) for intensive study plot BJ26 (6-F), pinyon-juniper woodland July, 1980

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Agropyron	4	4	6	22	2	12	2	4	7		2	5	5	11	2	1	30	7	8	11	5	11	3		8
smithii	2	2	1	7	1		7	11	8	4	14	9	11	24	39	4	4	7	17	8	25	41			1
Bromus	<1	<1		<1	1	<1		<1				<1	<1		<1		<1						1		
tectorum			<1		<1		<1			<1	1		<1	<1				<1	<1	<1				<1	
Oryzopsis		2	5														47	21					1		
hymenoides			<1		<1		<1				4		12	20			4		7	5			12		
Perennial	39	43	69	33	35	22	16	15	52	114	30	28	20	19	18	62	45	21	36	32	29	41	15	91	28
grasses	35	16	6	25	87	72	90	118	28	37	114	85	48	18	71	21	61	55	60	69	55	22	11	10	21
Annual																									
grasses																									
Perennial	8		3	5	9	19	8	19	2	3	4	10	6	12	18	4	9	2	12	16	10	16	25	14	59
forbs	19	4	13	25	14	27		14	34	4	13	33	32	13	5	58	81	18	6	58	11	12	7	14	6
Annual				<1			<1	<1	<1			<1	<1		1	<1	<1	<1	<1	<1		<1	<1	<1	<1
forbs	<1			1	<1	<1	<1	<1					1		<1	<1	4	<1	<1			<1		<1	
Half																									
shrubs		6											2												
Total	51	49	83	60	47	53	26	38	61	117	36	43	31	42	39	67	131	51	56	59	44	68	62	105	95
Biomass	68	22	20	87	102	103	97	143	70	45	146	127	106	75	115	83	154	80	89	140	91	75	30	24	29

Table A8.7.2-13 Oven dry weights (grams/m^2) for plot B.J. 11 (plot 1) 1980

Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
1-F 1	3.69	0.05	6.34	2.18	9.22	-	-	21.48
1-F 6	-	-	-	31.02	-	-	-	31.02
1-F 11	-	.05	5.33	19.35	-	-	-	24.73
1-F 20	4.26	-	9.37	54.79	0.40	-	-	68.82
1-F 21	45.81	0.02	-	6.01	0.02	-	-	51.86
1-F 33	-	-	-	32.51	-	-	-	32.51
1-F 35	5.32	-	-	12.03	4.27	-	-	21.62
1-F 38	11.73	0.19	3.23	0.67	-	-	-	15.82
1-F 43	-	1.52	4.04	14.00	9.68	0.18	7.22	36.82
1-F 50	14.58	0.61	0.98	2.38	0.58	3.20	-	22.33

Table A8.7.2-14 Oven dry weights (grams/m^2) for plot BJ22 (plot 2). 1980

Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
2-F 4	9.66	0.18	-	0.37	-	0.07	-	10.28
2-F 13	9.05	0.90	-	-	3.00	0.04	-	12.99
2-F 21	-	0.03	-	5.91	17.51	-	-	23.45
2-F 27	9.64	2.00	-	4.04	-	0.03	-	15.71
2-F 28	13.55	0.40	2.14	0.99	9.61	0.32	-	27.01
2-F 33	15.26	13.02	-	2.87	0.65	0.34	-	32.14
2-F 38	-	1.40	-	8.02	-	0.20	-	9.62
2-F 43	-	1.19	-	24.79	0.45	-	-	26.43
2-F 47	1.49	1.60	36.68	3.80	1.94	0.15	-	45.66
2-F 49	3.44	0.39	4.68	-	2.27	0.05	-	10.83

Table A8.7.2-15 Oven dry weights (grams/m^2) for plot BJ 25 (plot 5). 1980

Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
5-F 1	-	-	9.46	-	-	-	-	9.46
5-F 12	2.49	-	8.78	6.02	-	-	-	17.29
5-F 16	5.78	0.09	-	5.48	-	0.79	-	12.14
5-F 17	-	-	2.84	-	0.07	-	-	2.91
5-F 18	6.12	0.02	12.07	2.65	0.16	0.04	-	21.06
5-F 23	2.83	-	2.16	-	0.21	-	-	5.20
5-F 34	0.57	-	-	9.43	-	-	-	10.00
5-F 39	7.92	-	5.61	9.67	-	-	-	23.20
5-F 43	-	-	4.68	1.73	1.59	-	-	8.00
5-F 45	2.08	-	19.83	-	-	-	-	21.91

Table A8.7.2-16 Oven dry weights (grams/m^2) for plot BJ 26 (plot 6). 1980

Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
6-F 3	4.18	-	1.99	38.86	0.63	0.04	-	45.70
6-F 8	1.65	0.01	-	8.82	11.46	0.19	-	22.13
6-F 12	1.51	0.59	-	14.20	4.03	0.02	-	20.35
6-F 18	3.39	-	8.25	7.44	0.54	0.08	-	19.70
6-F 25	5.64	-	-	14.80	32.81	0.03	-	53.28
6-F 26	1.32	-	3.22	20.97	12.05	0.01	2.34	39.91
6-F 35	1.96	0.62	-	-	0.15	-	-	2.73
6-F 42	2.41	-	1.87	32.20	44.42	2.98	-	83.88
6-F 44	7.68	-	3.13	32.36	1.64	0.02	-	44.83
6-F 50	0.08	-	-	7.45	4.31	-	-	11.84

Table A8.7.2-17 Regression Equations used for converting fresh weight estimates to oven dry weights in Plot BJ21 (Plot 1).

Species/ Species Group	Regression Equations	Correlation Coefficient
Agropyron smithii	y = 0.60x - 1.20	1.00
Bromus tectorum	y = 1.09x - 0.03	.87
Oryzopsis hymenoides	y = 0.37x + 0.10	.94
Perennial Grasses	y = 0.52x + 2.03	.92
Perennial Forbs	y = 0.40x + 0.46	.97
Annual Forbs	y = 1.51x - 1.33	1.00
Half Shrubs	y = 0.52x - 0	1.00

Table A8.7.2-18 Regression equations used for converting fresh weight estimates to oven dry weights in Plot BJ22 (Plot 2). 1980 Data.

Species/ Species Group	Regression Equations	Correlation Coefficient
Agropyron smithii	y = 0.56x - 1.01	0.96
Bromus tectorum	y = 1.42x - 0.25	0.98
Oryzopsis hymenoides	y = 0.64x - 0.45	0.99
Perennial Grasses	y = 0.55x - 0.41	0.98
Perennial Forbs	y = 0.52x - 0.80	0.99
Annual Forbs	y = 0.27x + 0.06	0.83

Table A8.7.2-19 Regression equations used for converting fresh weight estimates to oven dry weights in Plot BJ25 (Plot 5-F). 1980 Data.

Species/ Species Group	Regression Equations	Correlation Coefficient
Agropyron smithii	y = 0.46x - 0.19	0.99
Bromus tectorum	y = 0.78x + 0.01	1.00
Oryzopsis hymenoides	y = 0.59x - 1.57	0.96
Perennial Grasses	y = 0.56x - 1.09	0.98
Perennial Forbs	y = 0.42x - 0.13	0.98
Annual Forbs	y = 0.83x - 0.04	1.00

Table A8.7.2-20 Regression equations used for converting fresh weight estimates to oven dry weights in Plot BJ26 (Plot 6). 1980 Data.

Species/ Species Group	Regression Equations	Correlation Coefficient
Agropyron smithii	y = 0.48x + 0.21	0.93
Bromus tectorum	y = 0.64x - 0.05	1.00
Oryzopsis hymenoides	y = 0.37x + 0.50	.99
Perennial Grasses	y = 0.59x - 2.33	.98
Perennial Forbs	y = 0.56x - 0.58	1.00
Annual Forbs	y = 0.75x - 0.01	1.00
Half Shrubs	y = 0.39x - 0	1.00

Table A8.7.2-21 Mean production ± the standard error of the mean (S.E.), frequency, and range of observed values for quadrats in Plots 1 and 2, July 1980. Based on data derived from regression equations. Production values in grams/m^2.

Species/ Species Group	Mean	± S.E.	Sample Size	Frequency (%)	Range of Values
PLOT 1					
Agropyron smithii	3.38	± 1.27	50	26	0-45.60
Bromus tectorum	0.81	± 0.38	50	60	0-15.23
Oryzopsis hymenoides	2.36	± 0.64	50	50	0-27.48
Other Perennial Grasses	22.21	± 2.38	50	96	0-77.43
Perennial Forbs	1.45	± 0.36	50	48	0-10.86
Annual Forbs	0.21	± 0.12	50	34	0- 3.20
Half Shrubs	0.15	± 0.15	50	2	0- 7.28
Total	30.57	± 2.28	50		
PLOT 2					
Agropyron smithii	6.14	± 1.03	50	68	0-26.43
Bromus tectorum	1.84	± 0.48	50	88	0-13.95
Oryzopsis hymenoides	3.47	± 1.20	50	28	0-41.15
Other Perennial Grasses	7.35	± 1.36	50	80	0-36.99
Perennial Forbs	2.91	± 0.99	50	72	0-43.40
Annual Forbs	0.07	± 0.01	50	58	0- 0.33
Total	21.78	± 1.64	50		

Table A8.7.2-22 Mean production ± the standard error of the mean (S.E.), frequency, and range of observed values for quadrats in Plots 5 and 6, July 1980. Based on data derived from regression equations. Production values in grams/m^2.

Species/ Species Group	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
PLOT 5				
Agropyron smithii	2.37 ± 0.47	50	54	0-11.77
Bromus tectorum	0.19 ± 0.07	50	54	0- 2.35
Oryzopsis hymenoides	3.62 ± 0.69	50	66	0-19.67
Other Perennial Grasses	5.04 ± 0.65	50	86	0-16.27
Perennial Forbs	0.67 ± 0.14	50	50	0- 3.65
Annual Forbs	0.12 ± 0.05	50	40	0- 1.62
Total	12.01 ± 0.87	50		
PLOT 6				
Agropyron smithii	4.21 ± 0.64	50	90	0-19.89
Bromus tectorum	0.04 ± 0.02	50	44	0- 0.59
Oryzopsis hymenoides	1.19 ± 0.43	50	30	0-17.89
Other Perennial Grasses	23.49 ± 2.42	50	100	1.21-67.29
Perennial Forbs	8.56 ± 1.32	50	96	0-44.78
Annual Forbs	0.14 ± 0.06	50	60	0- 2.99
Half Shrubs	0.06 ± 0.05	50	4	0- 2.34
Total	37.69 ± 2.87	50		

Table A8.7.2-23 Fresh weight estimates (grams) for irrigation/fertilizer study plots in chained pinyon-juniper rangeland. July 1980

Treatment Number	1a										2a									
Fertilizer Level (Lbs/Acre) N,P(NH4NO3,P205)	0,0										0,100									
Sprinkler set Time	18 hrs.										18 hrs.									
Quadrat Number	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Agropyron smithii		59	51	126		102	30	67	4	42			27	15	21	72	31	76	35	28
Bromus tectorum		1	4		2				<1			1	2	16	1		1	<1		3
Oryzopsis hymenoides	71	64			30		5		9		31	22	29	19				7	24	58
Perennial grasses			30	15	52	2	21	9	44	26	27	11			64	5	2	9	37	4
Annual grasses																				
Perennial forbs	6	4	8	4	11	4	6	14	5	7	7		2	4	8		<1	2	15	
Annual forbs					<1		<1		<1		<1	1		<1	<1	2			<1	
Half shrubs																				
Total Biomass	77	128	93	145	95	108	62	90	62	75	65	35	60	54	94	79	34	94	111	93

Table A8.7.2-23Cont'd Fresh weight estimates (grams) for irrigation/fertilizer study plots in chained pinyon-juniper rangeland. July 1980

Treatment Number	2b										3a									
Fertilizer Level (Lbs/Acre) N,P(NH4NO3,P2O5)	0,100										100,100									
Sprinkler set Time	12 hrs.										18 hrs.									
Quadrat Number	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Agropyron smithii	54		93	49	88	60		44	28	85	36	17		49	46	71	41	74	39	36
Bromus tectorum		2		3	1	2	1	<1	5	<1	<1			<1		<1			1	2
Oryzopsis hymenoides		19	16			18	68	21	13	5		15	24							10
Perennial Grasses	2	5	3		4	10	12		8	4	28	6	32	38	32	16	2	31	44	14
Annual Grasses																				
Perennial Forbs	18	2	2	5	34	7	5	4	13	2	16	4	10	2	31	24	17	42	9	8
Annual Forbs				<1	<1	<1	<1	<1	1			<1	4	4		<1			<1	<1
Half Shrubs																				
Total Biomass	74	28	114	57	127	97	86	69	68	96	80	42	70	93	109	111	60	147	93	70

Table A8.7.2-23 Cont'd Fresh weight estimates (grams) for irrigation/fertilizer study plots in chained pinyon-juniper rangeland. July 1980

Treatment Number	3b										4a									
Fertilizer Level (Lbs/Acre) N,P(NH4NO3,P205)	100,100										200,100									
Sprinkler set Time	12 hrs.										18 hrs.									
Quadrat Number	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Agropyron smithii	11	25	38		61	32	35		16		37	36	25	39	28	18	36	42	33	48
Bromus tectorum	1			1		1	2	3	<1	<1							<1		<1	
Oryzopsis hymenoides				44	2	14		50	26	30									16	3
Perennial Grasses	53	26		37	2	6	10	4	60	44	48	29	72	68	29	46	41	59	18	21
Annual Grasses																				
Perennial Forbs	14	7	15	28	40	69	10	44	27	31	32	25	11	5	4	4	17	6	27	18
Annual Forbs	<1	<1	<1	<1			1	<1			<1		<1			<1	<1		<1	<1
Half Shrubs																				
Total Biomass	79	58	53	110	105	122	58	101	129	105	117	90	108	112	61	68	94	107	94	90

Table A8.7.2-23 Cont'd Fresh weight estimates (grams) for irrigation/fertilizer study plots in chained pinyon-juniper rangeland. July 1980

Treatment Number	4b																			
Fertilizer Level (Lbs/Acre) N,P(NH4NO3,P2O5)	200,100																			
Sprinkler set Time	12 hrs.																			
Quadrat Number	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Agropyron smithii	48	54	4	63	78	81	96	22	35	27										
Bromus tectorum	1			1			2		3	<1										
Oryzopsis hymenoides	26		19			10														
Perennial Grasses	10	4	12	9	15	3		65	15	38										
Annual Grasses																				
Perennial Forbs	16	15	51	28	24	6	5	23	11	13										
Annual Forbs				<1			<1		<1	1										
Half Shrubs																				
Total Biomass	101	73	86	100	117	100	103	110	64	79										

Table A8.7.2-24 Oven dry weights (grams/m^2) for herbaceous biomass in fertilizer and irrigation treatments for irrigation study plots. 1980

Fertilizer Level (lbs./acre) N,P (NH_4NO_3,P_2O_5)	Sprinkler Set Time - Hours	Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perennial Grasses	Perennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
0,0	18	1	-	-	29.12	-	1.17	-	-	30.29
0,0	18	4	70.06	-	-	5.24	2.25	-	-	77.55
0,100	18	1	-	-	13.13	16.12	6.32	.75	-	36.32
0,100	18	7	20.79	0.61	-	1.15	0.60	-	-	23.15
100,100	18	3	-	-	13.31	16.34	4.98	2.63	-	37.26
100,100	18	7	19.03	-	-	0.31	9.04	-	-	28.38
200,100	18	1	16.78	-	-	25.16	15.66	0.23	-	57.83
200,100	18	6	7.84	-	-	21.08	1.98	.02	-	30.92
0,0	12	biomass in this treatment comes from								
0,0	12	adjacent open areas of range cage data in Irr area (10 cages)								
0,100	12	2	-	1.57	8.02	1.89	0.39	-	-	11.87
0,100	12	5	38.53	0.40	-	1.83	12.72	0.38	-	53.86
100,100	12	6	15.91	1.55	9.54	2.94	35.31	-	-	65.25
100,100	12	7	14.41	1.14	-	5.30	5.32	0.54	-	26.71
200,100	12	1	25.08	1.24	10.04	3.53	6.35	-	-	46.24
200,100	12	6	39.47	-	3.47	1.11	2.01	-	-	46.06

Table A8.7.2-25 Regression equations for converting fresh weight estimates to oven dry weights in the irrigation/fertilization study plots 1a - 4a and 2b - 4b.

Species/Species Group	Regression Equation	Correlation Coefficient
Agropyron smithii	y= 0.53x - 1.72	0.98
Bromus tectorum	y= 0.40x + 0.54	0.43
Oryzopsis hymenoides	y= 0.39x + 1.56	0.97
Perennial Grasses	y= 0.51x - 0.45	0.99
Perennial Forbs	y= 0.47x + 0.88	0.96
Annual Forbs	y= 0.58x + 0.23	0.96

Table A8.7.2-26 Mean production ± the standard error of the mean (S.E.), frequency, and range of observed values for quadrats in the irrigating/fertilization study plots 1a - 4a and 2b - 4b. Based on data derived from regression equations. Production values in grams/m^2.

	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
Site 1a				
Agropyron smithii	24.65 ± 7.36	10	80.0	0-70.06
Bromus tectorum	0.51 ± 0.24	10	40.0	0- 2.17
Oryzopsis hymenoides	7.73 ± 3.59	10	50.0	0-29.12
Perennial Grasses	9.66 ± 2.96	10	80.0	0-26.26
Perennial Forbs	4.06 ± 0.51	10	100.0	2.25-7.44
Annual Forbs	0.09 ± 0.04	10	30.0	0- 0.29
Total Biomass	46.70 ± 4.62	10	100.0	31.70-77.55
Site 2a				
Agropyron smithii	15.42 ± 4.25	10	80.0	0-38.63
Bromus tectorum	1.33 ± 0.66	10	70.0	0- 7.03
Oryzopsis hymenoides	8.42 ± 2.42	10	70.0	0-24.08
Perennial Grasses	8.14 ± 3.41	10	80.0	0-32.43
Perennial Forbs	2.58 ± 0.89	10	70.0	0- 7.91
Annual Forbs	0.38 ± 0.15	10	60.0	0- 1.40
Total Biomass	36.27 ± 3.93	10	100.0	17.07-54.50
Site 3a				
Agropyron smithii	20.06 ± 3.60	10	90.0	0-37.57
Bromus tectorum	0.41 ± 0.15	10	50.0	0- 1.36
Oryzopsis hymenoides	2.61 ± 1.46	10	30.0	0-13.31
Perennial Grasses	12.04 ± 2.29	10	100.0	0.31-22.15
Perennial Forbs	8.48 ± 1.90	10	100.0	1.81-20.58
Annual Forbs	0.64 ± 0.33	10	60.0	0- 2.63
Total Biomass	44.24 ± 4.83	10	100.0	20.35-73.62

Table A8.7.2-26 (contd.) Mean production ± S.E., frequency, and range of values for quadrats in study plots 1a - 4a and 2b - 4b.

	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
<u>Site 4a</u>				
Agropyron smithii	16.32 ± 1.45	10	100.0	7.84-23.76
Bromus tectorum	0.12 ± 0.08	10	20.0	0- 0.59
Oryzopsis hymenoides	1.05 ± 0.79	10	20.0	0- 7.77
Perennial Grasses	21.58 ± 3.10	10	100.0	8.79-36.54
Perennial Forbs	7.77 ± 1.57	10	100.0	1.98-15.66
Annual Forbs	0.14 ± 0.05	10	60.0	0- 0.29
Total Biomass	46.98 ± 3.09	10	100.0	30.34-57.83
<u>Site 2b</u>				
Agropyron smithii	24.58 ± 5.23	10	80.0	0-47.66
Bromus tectorum	0.98 ± 0.26	10	80.0	0- 2.57
Oryzopsis hymenoides	7.21 ± 2.60	10	70.0	0-27.96
Perennial Grasses	2.10 ± 0.62	10	80.0	0- 5.71
Perennial Forbs	4.64 ± 1.22	10	100.0	0.39-12.72
Annual Forbs	0.24 ± 0.08	10	60.0	0- 0.82
Total Biomass	39.75 ± 4.36	10	100.0	11.87-58.33
<u>Site 3b</u>				
Agropyron smithii	10.19 ± 3.16	10	70.0	0-30.67
Bromus tectorum	0.75 ± 0.20	10	70.0	0- 1.76
Oryzopsis hymenoides	7.64 ± 2.61	10	60.0	0-20.97
Perennial Grasses	12.12 ± 3.67	10	90.0	0-30.37
Perennial Forbs	14.43 ± 2.97	10	100.0	4.16-35.31
Annual Forbs	0.20 ± 0.06	10	60.0	0- 0.54
Total Biomass	45.33 ± 4.54	10	100.0	26.65-65.25

Table A8.7.2-26 (contd.) Mean production ± S.E., frequency, and range of values for quadrats in study plots 1a - 4a and 2b - 4b.

	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
Site 4b				
Agropyron smithii	25.20 ± 4.85	10	100.0	0.40-49.25
Bromus tectorum	0.59 ± 0.22	10	50.0	0- 1.76
Oryzopsis hymenoides	2.25 ± 1.26	10	30.0	0-10.04
Perennial Grasses	8.26 ± 3.23	10	90.0	0-32.94
Perennial Forbs	9.51 ± 2.09	10	100.0	2.01-24.80
Annual Forbs	0.17 ± 0.08	10	40.0	0- 0.82
Total Biomass	45.98 ± 2.77	10	100.0	32.20-59.07

Table A8.7.2-27 Oven dry weights (grams/m^2) for range cage and adjacent open areas in the irrigated chained rangeland community type. 1980

	Quadrat Number	*Agropyron smithii*	*Bromus tectorum*	*Oryzopsis hymenoides*	Perrennial Grasses	Perrennial Forbs	Annual Forbs	Half Shrubs	Total Biomass
FENCED	1	14.34	15.43	-	4.83	28.00	1.72	-	64.32
	2	51.46	0.30	2.68	33.03	3.56	1.54	-	92.57
	3	21.35	0.75	24.71	5.92	0.48	9.70	-	62.91
	4	18.13	-	-	8.53	.95	.25	1.39	29.25
	5	21.96	-	18.37	12.30	13.81	-	-	66.44
	6	-	-	-	41.34	4.10	-	-	45.44
	7	7.32	-	0.02	50.08	17.58	-	-	75.00
	8	29.98	0.20	3.00	-	0.12	-	-	33.30
	9	32.10	1.94	0.35	20.45	0.44	-	-	55.28
	10	21.24	-	-	27.28	14.49	-	0.79	63.80
OPEN	1	15.62	0.02	-	39.92	1.96	0.09	-	57.61
	2	64.60	9.02	-	4.24	4.66	5.45	-	87.97
	3	23.92	0.06	3.97	2.63	-	-	-	30.58
	4	25.90	-	-	9.96	5.06	-	-	40.92
	5	16.05	0.06	19.12	-	17.42	-	-	52.65
	6	-	4.43	-	36.37	38.48	-	-	79.78
	7	-	0.11	-	53.9	26.48	-	-	80.49
	8	0.49	8.50	5.68	29.06	29.68	3.70	-	77.11
	9	20.3	4.74	-	29.41	7.50	1.17	-	63.12
	10	16.02	-	-	21.76	28.72	-	-	66.5

Table A8.7.2-28 Mean production (grams/m^2) $\pm$ the standard error of the mean (S.E.), frequency, and range of observed values for clipped plots in the irrigated chained rangeland community type. 1980 data.

	Mean $\pm$ S.E.	Sample Size	Frequency (%)	Range of Values
OPEN AREAS				
Agropyron smithii	18.29 $\pm$ 6.00	10	80	0-64.60
Bromus tectorum	3.78 $\pm$ 1.39	10	80	0-9.02
Oryzopsis hymenoides	2.88 $\pm$ 1.92	10	30	0-19.12
Perennial Grasses	23.18 $\pm$ 5.59	10	90	0-53.90
Perennial Forbs	16.00 $\pm$ 4.40	10	90	0-38.48
Annual Forbs	1.04 $\pm$ 0.61	10	40	0-5.45
Total Biomass	63.67 $\pm$ 5.86	10	100	30.58-87.97
RANGE CAGES				
Agropyron smithii	21.79 $\pm$ 4.48	10	90	0-51.46
Bromus tectorum	1.86 $\pm$ 1.52	10	50	0-15.43
Oryzopsis hymenoides	4.91 $\pm$ 2.83	10	60	0-24.71
Perennial Grasses	20.38 $\pm$ 5.38	10	90	0-50.08
Perennial Forbs	8.35 $\pm$ 3.03	10	100	0.12-28.00
Annual Forbs	1.32 $\pm$ 0.95	10	40	0-9.70
Half Shrubs	0.22 $\pm$ 0.15	10	20	0-1.39
Total Biomass	58.83 $\pm$ 6.01	10	100	29.25-92.57

Table A8.9.1-1 Herb quadrat summaries for Top Soil Piles. Based on data from 25 permanently located quadrats. July 1980. Values in percents. ± values are equal to the standard error of the Mean.

Species	Mean Cover	Relative Cover	Range of Cover Values	Frequency
Agropyron cristatum	0.1	0.42	0-2	12
Agropyron intermedium	5.4	18.82	0-30	80
Agropyron pubesens	2.4	8.56	0-13	64
Agropyron sibericum	0.4	1.54	0-3	40
Agropyron smithii	1.6	5.76	0-7	60
Agropyron spicatum var inerme	0.1	0.42	0-2	20
Bromus tectorum	<0.1	<0.01	0-<1	4
Elymus junceus	<0.1	0.14	0-1	4
Oryzopsis hymenoids	<0.1	0.14	0-1	12
Astragalus purshii	<0.1	0.14	0-1	4
Chenopodium album	0.1	0.42	0-1	24
Cirsium arvense	0.1	0.28	0-1	4
Hedysarum boreale	1.9	6.60	0-8	48
Kochia iranica	0.9	3.23	0-7	52
Lactuca serriola	0.2	0.56	0-2	8
Medicago sativa	3.6	12.50	0-20	48
Melilotus officinales	0.4	1.40	0-4	12
Salsoa iberica	11.1	39.04	3-60	100
Amelanchier alnifolia	<0.1	<0.01	0-<1	4
Artemisia tridentata	<0.1	0.14	0-1	4
Cerocarpus montanus	<0.1	<0.01	0-<1	4
Purshia tridentata	<0.1	<0.01	0-<1	8
Total Herb in Herb Layer	24.9		11-65	100
Total Woody in Herb Layer	0.1		0-1	16
Mosses				0
Crustose Lichens	0.8		<1.3	100
Litter	24.2		2-65	100
Bare Soil	62.2		30-92	100
Rock	10.2		2-40	100

Mean No. of Herb Species per m^2 = 5.92 ± 0.25

Mean Total No. of Species per m^2 = 6.12 ± 0.27

Table A8.9.2-1 Fresh weight estimates (grams) for Top Soil Piles. July 1980.

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Agropyron cristatum					2		3		2								7						8		
Agropyron intermedium	15	5	13	65		31	30		82	23	48	106	125			88	118		23	46	14	136	45	4	
Agropyron pubesens	6		47	4	38	68	10	2	9		85	54		20	4	24	51				13	21	13		
Agropyron sibericum	1	4	2				7			4	4	18	4	1					2			3			
Agropyron smithii	4	39	36			2	13	18	9		11			67	6	6	46	15	6			9	22		12
Agropyron spictum				10										4	5					2				3	
Bromus inermis		2																							
Bromus tectorum			<1																			<1			
Elymus junceus	2																								
Oryzopsis hymenoides			2	4		1																			
Astragalus purshii																	7		3						
Chenopodium album				1	4	<1								4			2		7	2				5	
Hedysarum borrale	44	44	10	22		3	42	29	16		10	11	22			24	10								
Kochia iranica	19	2	21	38	10	2	2	9		1		6		14	7	7							6	21	88
Lactuca serriola																			31					48	
Medicago sativa														90	13	5	17	55	5	85	42	3	33	64	61
Melilotus officinalis							51											32			88			65	
Salsoa iberica	157	45	20	85	250	20	9	41	38	63	21	234	12	17	87	44	6	7	128	165	46	17	49	44	106
Total Biomass	248	141	151	229	304	127	167	99	156	91	179	429	163	217	122	198	264	109	205	300	203	189	176	254	266

Table A8.9.2-2 Oven dry weight (grams/m^2) for Top Soil Piles. 1980.

Species	Quadrat Numbers 1	3		7	14	17
Agropyron cristatum	-	-		1.05	-	3.14
Agropyron intermedium	9.25	8.60		20.33	-	68.34
Agropyron pubesens	4.42	31.70		3.65	7.00	29.64
Agropyron sibericum	0.36	1.07		5.21	0.29	-
Agropyron smithii	2.85	18.91		5.81	35.10	27.50
Agropyron spicatum var. *inerme*	-	-		-	1.29	-
Bromus inermis	-	-		-	-	-
Bromus tectorum	-	0.18		-	-	-
Elymus junceus	0.57	-		-	-	-
Oryzopsis hymenoides	-	1.11		-	-	-
Astragalus purshii	-	-		-	-	-
Chenopodium album	-	-		-	1.65	0.39
Cirsium arvense	-	-		-	-	-
Hedysarum borrale	13.65	1.96		16.57	-	1.86
Kochia iranica	3.76	9.78		0.21	6.31	-
Lactuca serriola	-	-		-	-	-
Medicago sativa	-	-		-	33.73	3.02
Melilotus officinalis	-	-		18.92	-	-
Salsoa iberica	51.41	8.45		3.55	5.40	1.18
TOTAL BIOMASS	86.27	81.76		75.30	90.77	135.07

Table A8.9.2-3 Regression Equations used for converting fresh weight estimates to oven dry weights in Top Soil Piles. 1980 data.

Species/ Species Group	Regression Equations	Correlation Coefficient
Agropyron cristatum	y = 0.52x - 0.52	0.99
Agropyron intermedium	y = 0.57x + 1.68	0.99
Agropyron pubesens	y = 0.66x - 2.38	0.97
Agropyron sibericum	y = 0.82x - 0.51	0.99
Agropyron smithii	y = 0.54x + 0.10	0.99
Agropyron spicatum var inerme	*1	
Oryzopsis hymenoides	*2	
Astragalus purshii	*3	
Chenopodium album	y = 0.63x - 0.87	0.99
Hedysarum borrale	y = 0.40x - 2.00	0.98
Kochia iranica	y = 0.39x - 0.43	0.82
Lactuca serriola	*4	
Medicago sativa	y = 0.42x - 3.55	0.99
Melilotus officinalis	*5	
Salsoa iberica	y = 0.33x + 0.41	0.99

*1 Not enough data points. Used equation for *Agropyron smithii*
*2 Not enough data points. Used equation for *Agropyron intermedium*
*3 No actual dry weight data. Used equation for *Chenopodium album*
*4 No actual dry weight data. Used equation for *Kochia iranica*
*5 Not enough data points. Used equation for *Medicago sativa*

Table A8.9.2-4 Mean Production $\pm$ the standard error of the Mean (S.E.), Frequency, and Range of observed values for quadrats at the Top Soil Piles, July 1980. Based on data derived from regression equations. Production values in grams/m^2.

Species	Mean $\pm$ S.E.	Sample Size	Frequency (%)	Range of Values
Agropyron cristatum	0.35 $\pm$ 0.19	25	20	0-3.64
Agropyron intermedium	24.46 $\pm$ 5.10	25	76	0-79.20
Agropyron pubesens	10.82 $\pm$ 3.09	25	68	0-53.72
Agropyron sibericum	1.42 $\pm$ 0.60	25	44	0-14.25
Agropyron smithii	7.00 $\pm$ 1.86	25	68	0-36.28
Agropyron spicatum var inerme	0.54 $\pm$ 0.26	25	20	0-5.50
Bromus inermis	0.02 $\pm$ 0.02	25	4	0-0.57
Bromus tectorum	0.01 $\pm$ 0.01	25	8	0-0.18
Elymus junceus	0.02 $\pm$ 0.02	25	4	0-0.57
Oryzopsis hymenoides	0.17 $\pm$ 0.12	25	12	0-2.77
Astragalus purshii	0.18 $\pm$ 0.15	25	8	0-3.54
Chenopodium album	0.41 $\pm$ 0.18	25	32	0-3.54
Hedysarum borrale	3.63 $\pm$ 1.05	25	52	0-15.6
Kochia iranica	3.67 $\pm$ 1.44	25	64	0-33.89
Lactuca serriola	1.20 $\pm$ 0.85	25	8	0-18.29
Medicago sativa	6.50 $\pm$ 2.19	25	48	0-34.25
Melilotus officinalis	3.40 $\pm$ 1.74	25	16	0-33.41
Salsoa iberica	22.98 $\pm$ 4.54	25	100	2.39-82.91
Total Biomass	86.86 $\pm$ 6.72	25	100	36.70-191.55

Table A8.11.1-1 Fresh weight estimates (grams) for Oldland Gulch Brush Beating.8/5/80

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Agropyron desatorum					1	1		3					4												
Agropyron smithii		7	28			40	122	2	46	65	55	21	60	12	62	33	21	13	40	114	33	80	60	35	76
Agropyron trachycaulum	68	23										50						5							
Bromus inermis						3		7																	
Bromus tectorum	2	<1				1	<1	6	1	<1	1	<1			<1	<1		1			1	<1	1		
Elymus cenerius		2		10																					
Oryzopsis hymenoides		16	35	31	42	27	3								20			2							
Sitanion longifolium																						4			5
Sporobolus cryptandrus	2													10		3									
Stipa comata														64	6	3	32	17	32		36			108	
Astragalus diversifolius	10						2												4						
Chenopodium album									1	<1			<1										1		
Descurainia pinnata													<1												
Lappula redowski	11							12	4																
Lepidium montanum									2																
Tragopogon dubius																						4			
Ceratoides lanata																						15			
Total Biomass	93	48	63	41	43	72	127	30	54	65	56	71	64	86	88	39	53	38	76	114	70	103	62	143	81

Table A8.11.1-2 Fresh weight estimates (grams) for Gardenhire Gulch Brush Beating. 8/5/80

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Agropyron intermedium		18	22													14									
Agropyron smithii	154			129	4				12				112			42	11	23					64		4
Agropyron trachycaulum																		88					17		
Bouteloua gracilis							27					15													16
Bromus inermis										5				3							3	8		4	
Bromus tectorum					<1	14	16	<1	3		1	18	4	7	12		<1	1	16	24	15	3	<1	7	8
Oryzopsis hymenoides			2				5					7			64	10			2			11	3	38	18
Satanion longifolium												16			1				14		7				
Sporobolus cryptandrus										28															
Stipa comata					94	47		109	48		68						35	11							
Chenopodium album																		5							
Kochia iranica			3																						
Melilotus officinalis										11		1		7	1										
Salsoa iberica												1													
Artemisia frigida																								32	
Ceratoides lanata												1									<1				
Total Biomass	154	18	27	129	98	61	48	109	63	44	69	59	116	17	78	66	46	128	32	24	25	22	84	81	46

Table A8.11.1-3 Fresh weight estimates (grams) for <u>Control</u> plots of Brush beating Area. 8/4/80

Quadrat Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Agropyron intermedium						2								2		4									
Agropyron smithii		4						29			10		10		34	5	39	6	9	26	13	15	12	2	45
Bouteloua gracilis				5							8	12													
Bromus tectorum				4	11	1		2		2	3	3	7	3	1		2		<1		<1	<1			
Oryzopsis hymenoides			1		6	22	32		31	16	3	2	3						4		3				
Sitanion longifolium	1		2		4																				
Stipa comata			31	68												17	19	45	18	7	11		2	15	34
Arabis holbeollii								3																	
Chenopodium album														2	4				1						
Descurainia pinnata																<1				<1					
Lappula redowski														3	1				1	<1					
Total Biomass	1	4	34	77	21	25	32	34	31	18	24	17	20	10	40	26	60	51	33	33	27	15	14	17	79

Table A8.11.1-4 Oven dry weight (grams/m^2) for Oldland Gulch Brush Beating Area. 1980.

Species	Quadrat Numbers 1	4	6	9	14	17	22
Agropyron desatorum	-	-	0.44	-	-	-	-
Agropyron smithii	-	-	14.16	21.51	6.28	13.20	46.07
Agropyron trachycalum	29.60	-	-	-	-	-	-
Bromus inerme	-	-	0.45	-	-	-	-
Bromus tectorum	1.86	-	0.38	1.64	-	-	0.08
Elymus cinerius	-	3.43	-	-	-	-	-
Oryzopsis hymenoides	-	13.06	10.35	-	-	-	-
Sitanion longifolium	-	-	-	-	-	-	2.29
Sporobolus cryptandrus	0.60	-	-	-	6.03	-	-
Stipa comata	-	-	-	-	39.48	20.87	-
Astragalus diversifolius	3.65	-	-	-	-	-	-
Chenopodium album	-	-	-	0.66	-	-	-
Descuriana pinnata	-	-	-	-	-	-	-
Lappula redowski	3.17	-	-	4.58	-	-	-
Lepidium montanum	-	-	-	0.53	-	-	-
Tragopogon dubius	-	-	-	-	-	-	1.15
Ceretoides lanata	-	-	-	-	-	-	8.02
TOTAL BIOMASS	38.88	16.49	25.78	28.92	51.79	34.07	57.61

Table A8.11.1-5 Oven dry weight (grams/m^2) for Gardenhire Gulch Brush Beating Area. 1980.

Species	Quadrat Numbers 1	2	5	7	10	12	18	24
Agropyron intermedium	-	7.09	-	-	-	-	-	-
Agropyron smithii	76.33	-	2.07	-	-	-	13.77	-
Agropyron trachycaulum	-	-	-	-	-	-	64.06	-
Bouteloua gracilis	-	-	-	10.76	-	7.72	-	-
Bromus ineame	-	-	-	-	1.54	-	-	1.00
Bromus tectorum	-	-	0.08	15.06	-	18.60	0.96	4.97
Orizopsis hymenoides	-	-	-	1.97	-	1.51	-	19.73
Satanion longifolium	-	-	-	-	-	6.74	-	-
Sporobolus cryptandrus	-	-	-	-	10.77	-	-	-
Stipa comata	-	-	54.86	-	-	-	7.42	-
Chenopodium album	-	-	-	-	-	-	1.88	-
Kochia iranica	-	-	-	-	-	-	-	-
Melilotus officinales	-	-	-	-	2.62	0.12	-	-
Salsoa iberica	-	-	-	-	-	0.14	-	-
Artemisia frigida	-	-	-	-	-	-	-	11.45
Ceretoides lanata	-	-	-	-	-	0.64	-	-
TOTAL BIOMASS	76.33	7.09	57.01	27.79	14.93	35.47	88.09	37.15

Table A8.11.1-6 Oven dry weight (grams/m^2) for Control plots of Brush Beating Area 1980.

Species	Quadrat Numbers 1	2	3	7	8	11	14	17	24
Agropyron intermedium	-	-	-	-	-	-	1.27	-	-
Agropyron smithii	-	2.16	-	-	5.44	5.62	-	26.96	1.08
Bouteloua gracilis	-	-	-	-	-	3.77	-	-	-
Bromus tectorum	-	-	-	-	1.85	2.47	2.06	1.08	-
Oryzopsis hymenoides	-	-	0.59	20.36	-	1.64	-	-	-
Stipa comata	-	-	17.57	-	-	-	-	21.51	9.73
Sitanion longifolium	0.67	-	0.88	-	-	-	-	-	-
Arabis holboellii	-	-	-	-	1.06	-	-	-	-
Chenopodium album	-	-	-	-	-	-	0.75	-	-
Descuriana pinnata	-	-	-	-	-	-	-	-	-
Lappula redowski	-	-	-	-	-	-	1.72	-	-
TOTAL BIOMASS	0.67	2.16	19.04	20.36	8.35	13.50	5.80	49.55	10.81

Table A8.11.1-7 Regression Equations used for converting fresh weight estimates to oven dry weights in Brush Beating Areas and Brush Beating Control Areas. 1980.

Species/ Species Group	Regression Equations	Correlation Coefficient
Agropyron smithii	$y = 0.51x - 0.02$	0.980
Bouteloua gracilis	$y = 0.36x + 1.49$	0.975
Bromus inermis	$y = 0.545x - 1.18$	0.999
Bromus tectorum	$y = 0.99x - 0.36$	0.993
Oryzopsis hymenoides	$y = 0.47x - 0.29$	0.929
Sitanion longifolium	$y = 0.40x + 0.32$	0.996
Sporobolus cryptandrus	$y = 0.37x + 0.87$	0.967
Stipa comata	$y = 0.55x + 3.70$	0.978
Chenopodium album	$y = 0.32x + 0.24$	0.984
Lappula redowski	$y = 0.04x + 2.92$	0.722
Melilotus officinalis	$y = 0.25x - 0.13$	0.999
Agropyron intermedium	*1	
Kochia iranica	*2	
Agropyron desatorum	*1	
Agropyron trachycaulum	*1	
Elymus cinerus	*3	
Astragalus diversifolius	*2	

*1 Not enough data points to develop regression equation. Used equation for *Agropyron smithii*.

*2 No actual dry weight data for *Kochia iranica* and not enough data points to develop regression equation for *Astragalus diversifolius*. Used equation for *Chenopodium album*.

*3 Not enough data points to develop regression equation. Used equation for *Satanion longifolium*.

Table A8.11.1-8 Mean Production + the standard error of the mean (S. E.), Frequency, and Range of observed values for quadrats in Oldland Gulch Brush beating area, 1980. Based on data derived from Regression equations. Production values in grams/m^2.

Species	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
Agropyron desatorum	0.18 ± 0.10	25	16	0-2.02
Agropyron smithii	20.90 ± 3.43	25	88	0-58.12
Agropyron trachycalum	2.98 ± 1.72	25	16	0.36.66
Bromus inermis	0.12 ± 0.11	25	8	0-2.64
Bromus tectorum	0.46 ± 0.23	25	60	0-5.58
Elymus cinerius	0.18 ± 0.14	25	8	0-3.43
Oryzopsis hymenoides	3.22 ± 1.21	25	32	0-19.45
Sitanion longifolium	0.17 ± 0.12	25	8	0-2.32
Sporobolus cryptandrus	0.33 ± 0.25	25	12	0-4.57
Stipa Comata	7.74 ± 3.08	25	32	0-63.10
Astragalus diversifolius	0.18 ± 0.15	25	8	0-3.65
Chenopodium album	0.07 ± 0.03	25	16	0-0.56
Descurainic pinnata	0.003 ± 0.003	25	4	0-0.08
Lappula redowski	0.39 ± 0.22	25	12	0-3.40
Lepidium montanum	0.02 ± 0.02	25	4	0-0.53
Tragopogon dubius	0.05 ± 0.05	25	4	0-1.15
Ceratoides lanata	0.32 ± 0.32	25	4	0-8.02
Total Biomass	37.20 ± 3.07	25	100	14.13-80.93

Table A8.11.1-9 Mean Production ± the standard error of the mean (S. E.), Frequency, and Range of observed values for quadrats in Gardenshire Gulch Brush beating area, 1980. Based on data derived from Regression equations. Production values in grams/m^2.

Species	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
Agropyron intermedium	1.10 ± 0.62	25	12	0-11.20
Agropyron smittii	11.31 ± 4.53	25	40	0-78.52
Agropyron trachycalum	2.14 ± 1.81	25	8	0-44.86
Bouteloua gracilis	1.01 ± 0.58	25	12	0-11.21
Bromus inermis	0.27 ± 0.14	25	20	0-3.18
Bromus tectorum	5.70 ± 1.42	25	76	0-23.40
Oryzopsis hymenoides	2.89 ± 6.81	25	40	0.29.79
Sitanion longifolium	0.66 ± 0.36	25	16	0.6.72
Sporobolus cyrptandrus	0.43 ± 0.43	25	4	0-10.77
Stipa comata	9.80 ± 3.75	25	36	0-63.65
Chemopodium album	0.08 ± 0.08	25	4	0-1.88
Kochia iranica	0.05 ± 0.05	25	4	0-1.20
Melilotus officinales	0.18 ± 0.12	25	16	0-2.62
Salsoa iberica	0.01 ± 0.01	25	4	0-0.14
Artemisia frigida	0.46 ± 0.46	25	4	0-11.45
Aratoides lanata	0.03 ± 0.03	25	8	0-0.64
Total Biomass	36.07 ± 4.04	25	100	8.65-78.52

Table A8.11.1-10 Mean Production ± the standard error of the mean (S. E.), Frequency, and range of observed values for quadrats in Brush beating Control Area, 1980. Based on data derived from Regression equations. Production values in grams/m^2.

Species	Mean ± S.E.	Sample Size	Frequency (%)	Range of Values
Agropyron intermedium	0.16 ± 0.095	25	12	0-2.02
Agropyron smithii	5.27 ± 1.39	25	60	0-22.93
Bouteloua gracilis	0.54 ± 0.31	25	12	0-5.81
Bromus tectorum	1.40 ± 0.50	25	56	0-10.53
Oryzopsis hymenoides	2.18 ± 0.88	25	44	0-14.75
Sitanion longifolium	0.15 ± 0.09	25	12	0-1.92
Stipa comata	7.50 ± 2.20	25	44	0-41.10
Arabis holboilli	0.04 ± 0.04	25	4	0-1.06
Chenopodium album	0.12 ± 0.07	25	12	0-1.52
Descurainia pinnata	0.01 ± 0.004	25	8	0-0.08
Lappula redowski	0.48 ± 1.11	25	16	0-3.04
Total Biomass	17.74 ± 2.36	25	100	0.72-47.99

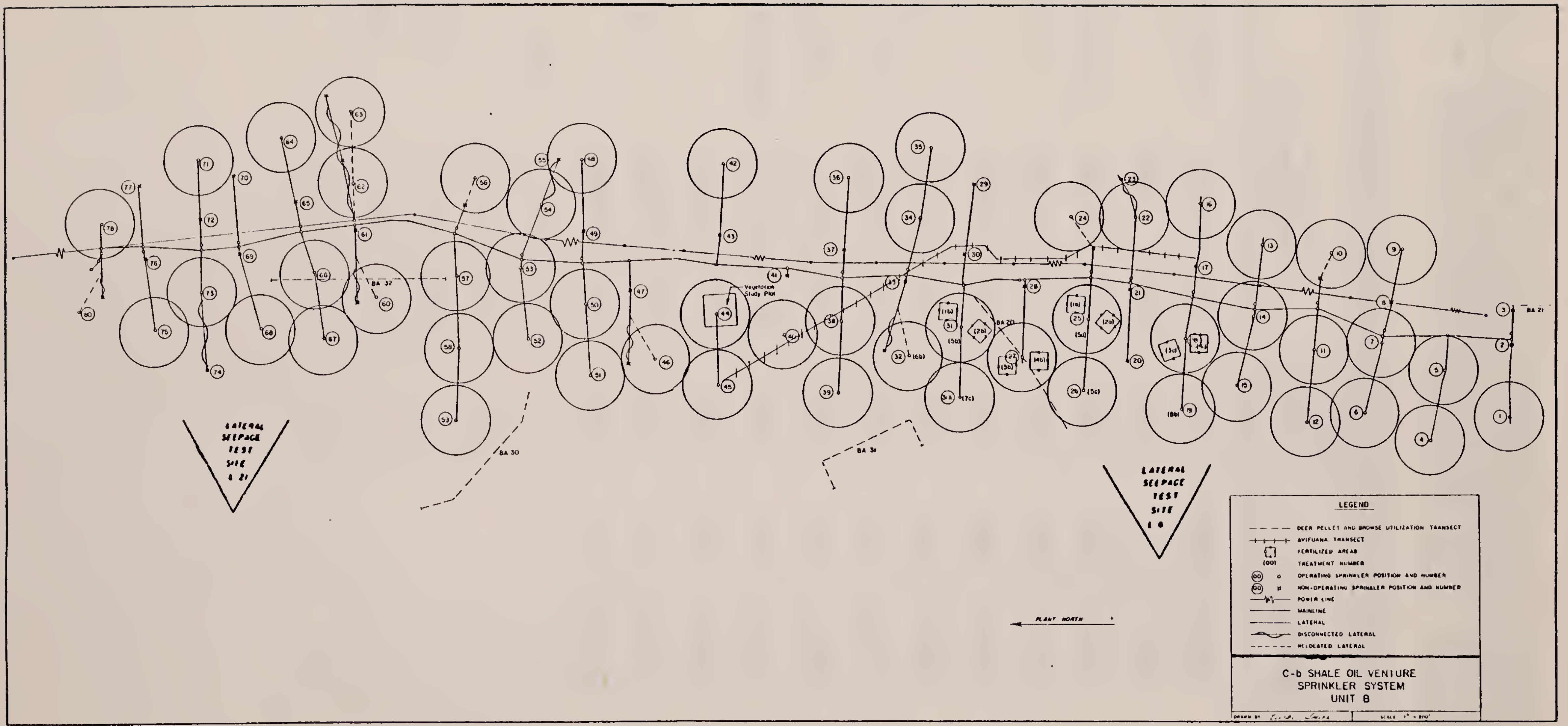

FIGURE A8.11.3-1

Map of C-b Tract Irrigation System Layout Showing Treatment Locations

Table A8.11.3-2 Location and volumetric water content at the beginning and end of the season for required water monitoring treatments.

		Location		Water Content	
Treatment	Depth Involved (feet)	Bearing Clockwise From North (degrees)	Distance (meters)	June 5†	October 17††
4a1	0-1	245	22.9	16	16
	1-2			22	--
	2-3			21	25
	3-4			25	--
4a2	0-1	236.5	26.0	21	28
	1-2			19	30
4a3	0-1	236.5	30.0	11	27
	1-2			22	25
	2-3			23	--
	3-4			24	--
4a4	0-1	240.0	33.1	16	26
	1-2			24	20
4b1	0-1	190	42.0	15	21
	1-2			26	21
4b2	0-1	201	39.4	17	18
	1-2			23	16
4b3	0-1	202	38.0	18	19
	1-2			28	17
4b4	0-1	204	38.0	16	18
	1-2			21	16
5a1	0-1	41	10.6	15	34
	1-2			19	33
5a2	0-1	29	15.8	15	34
	1-2			20	39
5a3	0-1	12.5	24.1	10	31
	1-2			21	33
5a4	0-1	341	25.3	12	22
	1-2			25	30

Table A8.11.3-2 Continued

Treatment	Depth Involved (feet)	Location: Bearing Clockwise From North (degrees)	Location: Distance (meters)	Water Content: June 5†	Water Content: October 17††
5b1	0-1	50	30	14	30
	1-2			32	34
	2-2.5			23	--
5b2	0-1	47.5	28.6	22	35
	1-2			25	36
5b3	0-1	50.0	25.9	13	33
	1-2			23	37
	2-2.5			25	--
5b4	0-1	54	20.6	15	30
	1-2			25	34
	2-2.5			27	--
5b5	0-1	35.5	24.1	19	28
	1-2			27	32
	2-2.5			24	--
5b6	0-1	35	24.1	17	29
	1-2			26	33
5b7	0-1	34.5	24.1	17	28
	1-1.5			25	32
5b8	0-1	32.0	21.3	12	31
	1-2			23	33
5b9	0-1	24.5	22.2	20	28
	1-2			21	29
5b10	0-1	19	24.8	19	27
	1.5			23	30
5c1	0-1	132	30.5	8	17
	1-2			15	16
5c2	0-1	124.5	27.1	11	20
	1-2			--	17
5c3	0-1	116.5	24.8	16	22
	1-2			18	22

Table A8.11.3-2 Continued

Treatment	Depth Involved (feet)	Location		Water Content	
		Bearing Clockwise From North (degrees)	Distance (meters)	June 5†	October 17††
5c4	0-1	111.0	22.8	11	20
	1-2			14	19
7c1	0-1	151	30.0	10	23
	1-1.5			24	25
7c2	0-1	172	28.0	14	--
	1-1.5			16	22
7c3	0-1	174	29.7	7	22
	1-2			21	19
7c4	0-1	202	31.0	9	27
	1-2			19	32
L61*	0-1			17	14
	1-2			17	12
	2-3			21	--
L62	0-1			14	22
	1-1.5			14	22
L63	0-1			16	16
	1-1.5			15	17
L64	0-1			16	15
	1-1.5			22	14
L211*	0-1			14	14
	1-2			14	14
L212	0-1			--	18
	1-1.5			--	17
L213	0-1			16	24
	1-1.5			20	25
L214	0-1			17	25
	1-2			14	27
L215	0-1			12	22
	1-2			23	24
	2-2.5			19	--

Table A8.11.3-2 Continued

		Location		Water Content	
Treatment	Depth Involved (feet)	Bearing Clockwise From North (degrees)	Distance (meters)	June 5†	October 17††
C1**	0-1	300	36	18	11
	1-2			20	10
C2	0-1	303	38	12	12
	1-2			15	11
C3	0-1	302	39	14	14
	1-1.5			12	12
C4	0-1	302	40	14	13
	1-1.5			25	13

†Gravimetric method using bulk density - 1.1 g cm^{-3}

††Campbell Pacific Hydroprobe calibration Eq: percent volumetric water content = 2.7137 + 18.400 (count ÷ standard count).

*L6 and L21 refer to lateral seepage areas west of sprinkler laterals 6 and 21.

**Unirrigated controls treatment.

Table A8.11.3-3 Mine discharge water quality including boron, total dissolved solids and fluoride during the irrigation period in 1980.

Date	Boron (mg/l)	Total Dissolved Solids (mg/l)	Fluoride (mg/l)
7-7	0.6	1200	19
7-16	0.5	1200	17
7-24	0.5	1300	19
8-11	0.7	1400	18
8-18	0.6	1500	17
9-3	0.7	1700	17
9-11	0.8	1500	19
9-18	0.7	1600	16
9-26	0.7	1600	18
10-3	0.4	1700	16
10-9	0.7	1500	15
10-20	0.8	1700	17
10-23	0.9	1400	20
10-30	0.9	1700	16

Table A8.11.3-4 Values of pH, electrical conductivity of saturation extract (ECe), exchangeable sodium percentage (ESP), and boron (ppm in saturated extract) from soils samples taken June 5 and December 16, 1980

Treat-ment	Depth Interval Feet	pH log[H] June	pH log[H] Dec	ECe mmhos/cm June	ECe mmhos/cm Dec	ESP % June	ESP % Dec	Boron ppm June	Boron ppm Dec
5a1	0-1	8.0	8.3	0.6	0.9	<1	6	0.38	0.41
	1-2	7.9	--	0.8	--	<1	--	0.50	--
5a2	0-1	7.8	8.4	0.9	1.1	<1	7	0.74	0.47
	1-2	7.7	--	1.0	--	<1	--	0.74	--
5a3	0-1	7.6	8.5	1.2	1.1	<1	11	1.04	0.46
	1-2	8.0	--	0.8	--	<1	--	0.63	--
5a4	0-1	7.5	8.2	1.0	1.4	<1	8	1.00	2.16
	1-2	8.0	--	0.5	--	<1	--	0.50	--
5b1	0-1	7.9	8.2	0.6	0.8	<1	8	0.52	0.19
	1-2	7.7	--	0.8	--	<1	--	0.57	--
	2-2.5	8.2	--	0.5	--	<1	--	0.34	--
5b2	0-1	7.5	8.5	1.4	1.0	<1	8	2.01	0.86
5b3	0-1	7.9	8.3	0.9	0.7	<1	5	1.20	0.17
	1-2	7.9	--	0.7	--	<1	--	0.62	--
	2-2.5	7.7	--	1.0	--	<1	--	1.36	--
5b4	0-1	7.8	8.2	0.5	0.7	<1	3	0.51	0.16
	1-2	7.9	--	0.6	--	<1	--	0.67	--
	2-2.5	8.3	--	0.6	--	<1	--	0.55	--
5c1	0-0.5	--	8.3	--	1.0	--	10	--	1.63
	0-1	7.5	--	0.4	--	<1	--	0.28	--
	1-2	7.8	--	0.4	--	<1	--	0.23	--
5c2	0-1	6.9	8.1	0.4	0.5	<1	2	0.44	0.10
	1-2	7.6	--	0.3	--	<1	--	0.27	--
5c3	0-1	7.3	8.0	0.5	0.4	<1	3	0.39	0.08
	1-2	7.8	--	0.4	--	<1	--	0.29	--
5c4	0-0.5	--	8.3	--	2.2	--	8	--	1.37
	0-1	7.5	--	0.4	--	<1	--	0.20	--
	1-2	7.9	--	0.4	--	<1	--	0.24	--
7c1	0-0.5	--	8.7	--	0.5	--	7	--	0.33
	0-1	7.9	--	0.4	--	<1	--	0.54	--
	1-1.5	7.5	--	0.5	--	<1	--	0.62	--
7c2	0-1	7.7	--	0.5	--	<1	--	0.57	--
	0-1.3	--	8.8	--	0.8	--	9	--	0.36
	1-1.5	7.7	--	0.8	--	<1	--	0.78	--
7c3	0-1	7.7	--	0.8	--	<1	--	0.74	--
	0-1.2	--	7.8	--	1.0	--	13	--	1.49
	1-2	8.5	--	1.7	--	15	--	4.43	--
7c4	0-1	8.3	8.4	0.7	0.5	4	2	0.80	0.10
	1-2	8.6	--	1.5	--	12	--	1.44	--

Table A8.11.3-5 Foliar concentration of boron, sodium, and fluoride in Indian rice grass on June 5 and December 16, 1980.

Treatment		Boron ppm		Sodium ppm		Fluoride ppm	
		June	Dec	June	Dec	June	Dec
5b	1	118.05	90.75	28.8	308.0	6.52	13.75
	2	82.3	0.0	35.2	1627.0	4.07	9.65
	3	186.2	30.5	7.4	537.6	2.56	7.88
	4	62.9	4.3	8.5	265.6	1.81	11.20
	5	10.98	22.8	42.9	546.9	0.89	20.41
6b	1	15.55	124.97	18.6	582.5	0.0	35.60
	2	33.2	38.06	3.4	727.3	1.03	35.68
	3	51.44	23.69	19.5	481.0	1.09	49.17
	4	--	100.2	--	648.0	--	52.29
	5	--	143.5	--	539.0	--	24.64
7c	1	22.79	39.13	23.7	623.7	0.0	41.29
	2	109.6	41.39	6.2	305.2	1.01	48.18
	3	112.06	43.75	11.0	481.7	0.0	36.03
	4	--	--	--	1121.5	--	58.85
	5	--	--	--	775.4	--	44.31
8b	1	--	--	--	--	--	--
	2	--	--	--	--	--	--
	3	--	--	--	--	--	--
	4	--	--	--	--	--	--
	5	--	--	--	--	--	--

Table A8.11.3-6 Foliar concentration of boron, sodium and fluoride in western wheat grass on June 5 and December 16, 1980.

Treatment		Boron ppm		Sodium ppm		Fluoride ppm	
		June	Dec	June	Dec	June	Dec
5b	1	34.6	17.79	15.8	317.0	4.23	14.32
	2	4.33	83.44	55.5	1069.2	2.36	19.11
	3	28.2	48.32	25.0	2151.4	1.94	56.12
	4	60.8	12.0	28.8	434.2	0.885	24.31
	5	172.5	0	46.0	808.9	0.802	23.93
6b	1	21.09	91.73	21.1	328.9	13.02	27.51
	2	15.89	99.08	214.2	769.9	11.0	34.88
	3	31.5	16.18	49.5	345.9	8.44	53.52
	4	--	10.4	--	721.0	--	52.62
	5	--	11.0	--	421.6	--	38.64
7c	1	55.97	42.06	53.9	716.7	1.03	50.93
	2	36.6	27.84	32.5	707.7	1.06	55.51
	3	33.25	28.71	49.0	643.0	0	37.51
	4	--	0	--	946.8	--	48.68
	5	--	48.4	--	552.5	--	32.29
8b	1	39.9	89.04	46.8	681.5	--	30.23
	2	93.8	69.36	66.3	311.3	0.79	44.68
	3	80.35	34.90	<0.01	533.8	0	31.98
	4	--	13.9	--	253.3	--	20.79
	5	--	0	--	440.5	--	33.19

Table A8.11.3-7 Foliar concentration of boron, sodium, and fluoride in big sage brush on June 5 and December 16, 1980

Treatment		Boron ppm		Sodium ppm		Fluoride ppm	
		June	Dec	June	Dec	June	Dec
5b	1	103.9	149.05	46.0	1133.6	1.21	7.91
	2	136.4	116.95	36.2	603.1	0	10.98
	3	96.53	60.5	49.2	393.0	0	8.98
	4	205.1	180.1	48.2	306.6	0	7.87
	5	61.86	58.2	23.3	881.3	0	8.20
6b	1	21.8	143.09	62.2	724.6	4.49	23.23
	2	58.20	173.43	55.3	510.9	3.31	16.37
	3	71.40	84.74	67.3	523.7	0.919	14.39
	4	--	58.8	--	277.6	--	23.11
	5	--	74.1	--	829.3	--	5.17
7c	1	69.68	131.81	26.4	1679.0	0.87	26.78
	2	108.6	183.96	681.5	254.1	0	17.93
	3	59.00	82.95	4893.0	1814.6	0.23	17.47
	4	--	213.7	--	1468.3	--	13.81
	5	--	79.4	--	280.0	--	14.18
8b	1	84.76	96.52	74.5	826.5	0	13.87
	2	443.9	140.31	44.9	504.1	0	10.74
	3	147.62	125.56	61.7	682.6	0	10.20
	4	--	105.0	--	1568.0	--	8.98
	5	--	40.8	--	435.7	--	8.99

Table A8.11.3-8 1980 weather data summary statistics for the C-b Tract, TRL 23.

TEMPERATURE (DEG F) RH (%) SOLAR RADIATION (LANGLEYS)

DATE	TIME	MN_TMP	MX_TMP	TOT_SR	MEAN_RH
01JUL80	AM	57	74	248.1	52.0000
01JUL80	PM	56	60	12.4	89.9167
02JUL80	AM	54	65	196.8	82.5833
02JUL80	PM	54	59	3.2	85.8333
03JUL80	AM	63	76	389.1	44.7500
03JUL80	PM	53	72	15.9	67.0000
04JUL80	AM	57	71	145.4	25.1667
04JUL80	PM	51	58	16.7	55.2500
05JUL80	AM	.	.	.	13.2500
05JUL80	PM	.	.	.	25.2500
06JUL80	AM	.	.	.	15.3333
06JUL80	PM	.	.	.	23.0833
07JUL80	AM	64	77	85.4	37.2500
07JUL80	PM	57	61	0.0	57.8333
08JUL80	AM	62	75	415.2	38.4167
08JUL80	PM	54	70	15.9	74.6667
09JUL80	AM	63	80	323.2	32.7500
09JUL80	PM	52	76	16.3	63.5833
10JUL80	AM	71	81	332.3	31.7500
10JUL80	PM	62	73	15.1	51.5000
11JUL80	AM	70	82	334.4	34.0000
11JUL80	PM	64	78	14.8	45.5833
12JUL80	AM	68	78	151.2	39.9167
12JUL80	PM	66	67	5.5	45.1667
13JUL80	AM	55	73	200.7	58.0833
13JUL80	PM	55	63	5.5	74.1667
14JUL80	AM	60	75	404.7	43.3333
14JUL80	PM	52	71	5.5	61.8333
15JUL80	AM	68	80	426.0	16.8333
15JUL80	PM	60	73	15.9	23.4167
16JUL80	AM	63	83	409.4	25.5000
16JUL80	PM	56	78	14.3	30.8333
17JUL80	AM	70	85	421.0	21.0000
17JUL80	PM	61	78	14.3	26.0833
18JUL80	AM	65	85	414.6	28.2500
18JUL80	PM	57	79	13.9	30.1667
19JUL80	AM	69	83	374.7	24.1667
19JUL80	PM	67	76	2.3	25.0000
20JUL80	AM	64	83	401.4	29.0833
20JUL80	PM	57	78	13.9	38.7500
21JUL80	AM	65	84	417.5	26.3333
21JUL80	PM	59	80	13.9	32.6667
22JUL80	AM	71	87	385.1	27.0833
22JUL80	PM	63	81	13.9	29.9167
23JUL80	AM	71	80	154.2	44.0833
23JUL80	PM	65	71	10.5	51.3333
24JUL80	AM	64	78	251.2	47.7500
24JUL80	PM	58	65	7.1	71.0000
25JUL80	AM	61	79	321.0	50.5000
25JUL80	PM	55	72	12.8	65.7500
26JUL80	AM	61	84	371.7	37.0000
26JUL80	PM	55	74	13.2	43.2500
27JUL80	AM	66	83	414.6	30.7500
27JUL80	PM	60	79	12.4	30.4167
28JUL80	AM	72	88	308.6	25.5000

Table A8.11.3-8 Continued.

TEMPERATURE (DEG F) RH (%) SOLAR RADIATION (LANGLEYS)

DATE	TIME	MN_TMP	MX_TMP	TOT_SR	MEAN_RH
28JUL80	PM	62	81	19.0	26.0000
29JUL80	AM	66	87	233.8	30.4167
29JUL80	PM	61	77	22.6	46.9167
30JUL80	AM	65	77	260.2	51.8333
30JUL80	PM	60	69	10.5	70.8333
31JUL80	AM	63	81	361.4	50.0833
31JUL80	PM	58.1 57	79.8 76	11.7	47.0833
01AUG80	AM	68	82	260.3	42.1667
01AUG80	PM	61	70	8.6	47.8333
02AUG80	AM	65	82	337.7	31.1667
02AUG80	PM	58	78	11.3	64.1667
03AUG80	AM	65	83	312.4	31.9167
03AUG80	PM	61	74	9.7	34.6667
04AUG80	AM	62	81	410.8	19.9167
04AUG80	PM	55	73	11.7	33.4167
05AUG80	AM	65	83	389.9	28.5000
05AUG80	PM	56	76	3.5	32.3333
06AUG80	AM	73	83	396.7	27.7500
06AUG80	PM	66	76	10.5	32.5000
07AUG80	AM	74	85	392.7	25.0000
07AUG80	PM	64	79	10.5	33.6667
08AUG80	AM	73	86	386.6	26.2500
08AUG80	PM	65	78	10.5	33.9167
09AUG80	AM	72	83	316.7	34.3333
09AUG80	PM	65	78	10.1	39.6667
10AUG80	AM	64	83	391.9	28.4167
10AUG80	PM	59	77	9.3	36.3333
11AUG80	AM	61	83	394.6	20.7500
11AUG80	PM	55	77	10.5	24.5833
12AUG80	AM	68	85	301.3	29.0833
12AUG80	PM	61	67	10.1	35.8333
13AUG80	AM	62	79	193.7	47.3333
13AUG80	PM	58	63	8.9	70.6667
14AUG80	AM	62	77	290.0	47.0000
14AUG80	PM	57	72	9.0	62.9167
15AUG80	AM	53	69	295.4	51.7273
15AUG80	PM	53	56	0.0	79.4167
16AUG80	AM	55	66	195.3	46.1667
16AUG80	PM	50	63	7.4	71.7500
17AUG80	AM	56	75	315.8	28.7500
17AUG80	PM	46	67	7.8	64.8333
18AUG80	AM	67	76	385.8	17.6667
18AUG80	PM	60	69	8.6	27.9167
19AUG80	AM	55	69	312.4	25.4167
19AUG80	PM	47	63	8.9	42.9167
20AUG80	AM	48	68	379.4	34.5833
20AUG80	PM	40	63	8.6	58.3333
21AUG80	AM	52	75	375.5	26.6667
21AUG80	PM	45	69	8.6	32.1667
22AUG80	AM	64	80	364.8	19.3000
22AUG80	PM	57	70	8.2	31.0833
23AUG80	AM	63	72	256.0	60.5000
23AUG80	PM	53	67	1.9	65.2500
24AUG80	AM	54	67	202.7	.
24AUG80	PM	53	60	2.3	.

Table A8.11.3-8 Continued

TEMPERATURE (DEG F) RH (%) SOLAR RADIATION (LANGLEYS)					
DATE	TIME	MN_TMP	MX_TMP	TOT_SR	MEAN_RH
25AUG80	AM	53	68	191.9	.
25AUG80	PM	51	56	5.4	.
26AUG80	AM	53	69	321.0	.
26AUG80	PM	51	55	6.2	.
27AUG80	AM	57	74	331.3	.
27AUG80	PM	50	66	7.0	.
28AUG80	AM	65	75	363.2	.
28AUG80	PM	59	66	7.4	.
29AUG80	AM	64	70	248.9	14.2000
29AUG80	PM	58	65	3.5	18.4000
30AUG80	AM	59	71	221.0	20.3333
30AUG80	PM	53	64	3.9	27.5833
31AUG80	AM	47	64	187.9	35.5833
31AUG80	PM	44	55	6.2	65.3333
01SEP80	AM	51	71	346.0	24.2500
01SEP80	PM	43	65	7.0	60.6667
02SEP80	AM	62	74	346.1	20.7500
02SEP80	PM	52	65	6.2	37.6667
03SEP80	AM	64	76	303.2	20.4167
03SEP80	PM	60	67	5.8	29.5000
04SEP80	AM	57	78	311.2	24.9167
04SEP80	PM	51	71	5.8	41.5833
05SEP80	AM	60	81	274.3	23.5000
05SEP80	PM	54	73	5.4	33.7500
06SEP80	AM	60	76	217.6	41.4167
06SEP80	PM	57	66	2.3	59.6667
07SEP80	AM	62	69	155.1	52.7500
07SEP80	PM	56	60	3.9	78.5000
08SEP80	AM	53	60	132.2	82.5833
08SEP80	PM	52	58	0.8	86.5000
09SEP80	AM	50	60	83.3	81.2500
09SEP80	PM	49	56	1.2	90.2500
10SEP80	AM	52	65	116.3	75.2500
10SEP80	PM	49	56	1.6	82.7500
11SEP80	AM	53	62	260.1	47.0000
11SEP80	PM	47	56	4.7	71.2500
12SEP80	AM	51	63	139.3	56.7500
12SEP80	PM	48	62	3.5	77.0833
13SEP80	AM	60	76	205.1	23.9167
13SEP80	PM	55	68	2.3	51.6667
14SEP80	AM	59	71	235.5	24.5000
14SEP80	PM	56	63	4.3	37.0833
15SEP80	AM	57	72	292.2	26.0833
15SEP80	PM	52	63	4.3	45.5833
16SEP80	AM	60	69	311.5	23.4167
16SEP80	PM	57	62	2.7	41.5833
17SEP80	AM	54	72	313.3	23.0000
17SEP80	PM	50	62	4.3	39.9167
18SEP80	AM	58	77	281.1	23.5000
18SEP80	PM	51	71	4.3	34.8333
19SEP80	AM	65	75	189.3	23.0000
19SEP80	PM	46	67	3.9	38.5000
20SEP80	AM	42	65	302.0	36.9167
20SEP80	PM	39	57	6.2	63.0000
21SEP80	AM	49	64	241.8	22.3333

Table A8.11.3-8 Continued.

TEMPERATURE (DEG F) RH (%) SOLAR RADIATION (LANGLEYS)

DATE	TIME	MN_TMP	MX_TMP	TOT_SR	MEAN_RH
21SEP80	PM	42	55	3.5	48.2500
22SEP80	AM	37	59	302.6	32.2500
22SEP80	PM	34	51	3.5	62.0833
23SEP80	AM	41	65	295.8	23.1667
23SEP80	PM	38	55	3.5	37.1667
24SEP80	AM	44	64	294.7	33.3333
24SEP80	PM	41	56	3.1	40.7500
25SEP80	AM	42	67	291.5	28.5833
25SEP80	PM	39	58	3.1	34.6667
26SEP80	AM	52	71	287.9	25.4167
26SEP80	PM	46	60	3.1	37.1667
27SEP80	AM	55	70	191.7	29.2500
27SEP80	PM	54	61	2.7	38.7500
28SEP80	AM	54	71	163.1	28.8333
28SEP80	PM	52	62	2.7	41.0000
29SEP80	AM	51	70	282.1	26.0000
29SEP80	PM	49	63	2.7	35.6667
30SEP80	AM	52	78	274.8	22.4167
30SEP80	PM	49	65	2.7	32.6667
01OCT80	AM	51	74	272.5	26.9167
01OCT80	PM	51	64	2.3	31.5000
02OCT80	AM	41	63	272.5	39.2500
02OCT80	PM	39	56	1.9	39.1667
03OCT80	AM	44	69	247.1	29.4167
03OCT80	PM	43	61	0.0	37.0833
04OCT80	AM	49	71	268.7	26.1667
04OCT80	PM	48	62	2.3	32.7500
05OCT80	AM	52	70	260.5	30.5000
05OCT80	PM	50	61	1.9	30.5000
06OCT80	AM	49	72	256.1	34.2500
06OCT80	PM	47	63	1.9	35.6667
07OCT80	AM	52	73	256.9	29.8333
07OCT80	PM	47	65	1.9	33.5000
08OCT80	AM	50	73	248.1	32.9167
08OCT80	PM	49	65	1.6	32.1667
09OCT80	AM	49	71	249.9	31.0000
09OCT80	PM	47	59	1.6	29.9167
10OCT80	AM	39	64	247.7	44.5000
10OCT80	PM	38	54	1.6	38.5000
11OCT80	AM	48	70	232.5	29.3333
11OCT80	PM	44	58	1.6	39.0000
12OCT80	AM	44	62	101.2	59.5833
12OCT80	PM	46	57	0.8	54.0000
13OCT80	AM	44	56	224.1	53.6667
13OCT80	PM	41	50	0.4	76.4167
14OCT80	AM	38	54	123.2	64.0000
14OCT80	PM	37	46	3.1	90.4167
15OCT80	AM	33	40	150.5	56.9167
15OCT80	PM	32 *	38	0.4	82.9167
16OCT80	AM	26	33	108.8	86.6667
16OCT80	PM	27	32	0.4	89.7500
17OCT80	AM	31	38	123.8	72.0000
17OCT80	PM	29	32	0.4	90.0833
18OCT80	AM	33	42	109.4	66.7500
18OCT80	PM	31	37	0.4	83.9167

* Frost starts here

Table A8.11.3-8 Continued.

TEMPERATURE (DEG F) RH (%) SOLAR RADIATION (LANGLEYS)

DATE	TIME	MN_TMP	MX_TMP	TOT_SR	MEAN_RH
19OCT80	AM	32	51	235.7	52.9167
19OCT80	PM	31	42	1.9	80.6667
20OCT80	AM	32	54	233.7	50.1667
20OCT80	PM	33	44	2.3	79.4167
21OCT80	AM	36	53	224.6	38.7500
21OCT80	PM	35	42	0.8	66.3333
22OCT80	AM	41	54	199.2	36.6667
22OCT80	PM	30	42	0.4	48.2500
23OCT80	AM	21	36	222.3	54.9167
23OCT80	PM	20	30	0.8	57.5000
24OCT80	AM	26	47	220.9	34.6667
24OCT80	PM	24	36	0.8	59.9167
25OCT80	AM	32	55	220.2	18.9167
25OCT80	PM	31	44	0.4	36.1667
26OCT80	AM	35	46	85.4	44.9167
26OCT80	PM	31	44	0.0	55.8333
27OCT80	AM	26	29	51.2	89.6667
27OCT80	PM	21	31	0.0	87.3333
28OCT80	AM	19	32	147.8	65.8333
28OCT80	PM	17	28	0.4	84.8333
29OCT80	AM	23	45	219.4	45.3333
29OCT80	PM	21	37	0.8	79.9167
30OCT80	AM	34	56	200.7	36.7500
30OCT80	PM	33	43	0.4	63.9167
31OCT80	AM	39	57	173.6	34.1667
31OCT80	PM	38	45	0.0	56.4167

Table A8.11.3-9 Average monthly weather data for Grand Junction and the C-b Tract and estimated ET values for the C-b Tract.

Month	Grand Junction[1/]				C-b Tract		
	Radiation Langleys/month		Temperature Ave °F		Temp.Ave. °F[2/]		ET[3/]
			Maximum	Minimum	Max	Min	gpm/acre
April	538	(546)	62.2(65)	32.5(40)	55.2	33.7	2.0 (2.3)[4/]
May	536	(615)	67.7(75)	43.2(49)	60.0	44.8	2.3 (3.0)
June	735	(708)	86.5(86)	47.6(57)	76.7	49.4	3.9 (4.0)
July	633	(600)	90.5(93)	57.0(64)	79.8	58.1	3.7 (3.9)
Aug.	577	(595)	85.4(89)	53.0(62)	76.6	55.6	3.2 (3.6)
Sept.	425	(514)	79.9(81)	49.6(54)	70.2	51.8	2.2 (2.8)

1/ 1980 data; without parentheses, courtesy of the U.S. Water and Power Resource Services and long term records (in parentheses) taken from the "Climatic Atlas of the United States."

2/ April, May and June values estimated by multiplying Tmax GJ by the average ratio of Tmax C-b to Tmax GJ for July, August and September. The same procedure was applied to the minimum temperature. For example,

$$\text{Tmax C-b for April} = \frac{\left(\frac{79.8}{90.5} + \frac{76.6}{85.4} + \frac{70.3}{79.9}\right)}{3} \text{ X } 62.2$$

$$= \frac{(.88 + 90 + .88)}{3} \text{ X } 62.2\ °F = 55.2\ °F$$

3/ ET calculated by Hargreaves (1977) equation using Grand Junction function radiation and C-b Tract Temperature.

4/ Long term radiation and GJ adjusted temperature data was used to estimate long term ET (in parentheses).

Table 8.11.3-1 Fluoride tolerance[1/] levels in feed and water of domestic animals.

Species	Feed[2/] ppm	Water [3/] mg/liter
Heifers, dairy and beef cattle	30	2.5-5
Dairy cattle, mature	40	4-8
Beef cattle, mature	50	6-10
Finishing cattle	100	12-15
Breeding ewes	60	6-9
Horses	60	4-10
Feeder lambs	150	12-15

[1/] Biological availability depends on chemical composition. Dissolved F in water appears to be more readily assimilated than other forms.

[2/] The values must be reduced proportionately when both water and feed contain appreciable amounts of fluoride.

[3/] The average ambient air temperature and the physical and biological activity of the animals influence the amount of water consumed and hence the wide range of tolerance levels suggested. For active animals in a warm climate the lower values should be used as critical indicators.

Table A8.11.3-10 References

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